University of Alberta

Market Opportunities For Alberta Table Potato Producers In British Columbia

by

Kevin Joseph Dunlevy

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Master of Science

in

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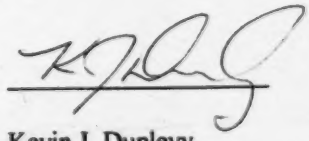

Kevin J. Dunlevy

8 Graham Avenue
Truro, Nova Scotia B2N 3P8

Date: October 1, 1998

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Market Opportunities for Alberta Table Potato Producers in British Columbia by Kevin J. Dunlevy in partial fulfilment of the requirements for the degree of Master of Science in Agricultural Economics.

M.L. Lerohl, Supervisor

K.Z. Chen

P. Jelen

A.G. Stuart

Date: Oct 6/98

Abstract

Market opportunities in British Columbia for Alberta produced table potatoes are examined in order to (1) assess the cost-competitiveness of the Alberta table potato sector compared with costs of potato production in British Columbia and the Pacific Northwest (PNW) of the United States, (2) provide a preliminary understanding of potential trade flows and trading volumes based on relative cost-competitiveness, and (3) assess the importance of particular potato attributes to table potato buyers in British Columbia.

Conditions under which inter-province and international trade takes place were documented in order to determine whether trade rules affect Alberta shippers differently than British Columbia or PNW producers. No overt barriers to trade were found.

Based on available cost estimates, Alberta producers are cost-competitive in the British Columbia table potato market as compared to producers in British Columbia, as are PNW producers. Further, based on table potato attributes considered important to buyers in the British Columbia market, Alberta potatoes are preferred to those from the PNW. Locally grown British Columbia potatoes are preferred however, to all other competing region's table potatoes.

Acknowledgements

Gratefully acknowledged in his contributions to this report is Mel Lerohl. I also extend my gratitude to the rest of my thesis committee, including Kevin Chen, Alan Stuart and Paul Jelen. Special thanks to Vic Adamowizc and Jim Untershultz for their advice and recommendations. This report would not have been possible, however, without the interest shown and funding support provided by the Alberta Agricultural Research Institute (AARI) and by the Potato Growers of Alberta (PGA). I am grateful to the AARI and to the PGA for the funding which permitted undertaking this study, and for their support of studies that attempt to broaden our knowledge of markets for Alberta-based farm products. Finally I would like to thank my wife Lynnette for her constant companionship during this process.

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Abbreviations and Acronyms

AoA	-	Agreement on Agriculture
AARI	-	Alberta Agricultural Research Institute
AMS	-	Agricultural Marketing Service
APMA	-	Agricultural Products Marketing Act
ARFAA	-	Atlantic Region Freight Assistance Act
AVC	-	Average Variable Cost
BCMB	-	British Columbia Marketing Board
BCVMC	-	British Columbia Vegetable Marketing Commission
CAPA	-	Canadian Agricultural Products Act
CFTA	-	Canada-U.S. Free Trade Agreement (1989)
CHC	-	Canadian Horticultural Council
CITT	-	Canadian International Trade Tribunal
cwt	-	hundredweight
DFAIT	-	Department of Foreign Affairs and International Trade
DOC	-	Department of Commerce
ERS	-	Economic Research Service
EU	-	European Union
FAS	-	Foreign Agricultural Service, U.S. Dept. of Agriculture
FFVR	-	Fresh Fruit and Vegetable Regulations
FIC	-	The Food Institute of Canada
FPMAA	-	Farm Products Marketing Agencies Act
GATT	-	General Agreement on Tariffs and Trade
LOP	-	the Law of One Price
mmt	-	million metric tonnes
NAFTA	-	North American Free Trade Agreement (1994)
NASS	-	National Agricultural Statistics Service
NPPB	-	National Potato Promotion Board
OECD	-	Organization for Economic Cooperation and Development
PEI	-	Prince Edward Island
PGA	-	Potato Growers of Alberta
PNW	-	Pacific Northwestern United States
PPR	-	Processed Products Regulations
TRQ	-	Tariff-rate quota
TVC	-	Total Variable Cost
U.S.	-	United States
USDA	-	United States Department of Agriculture
USITC	-	United States International Trade Commission
WTO	-	World Trade Organization (1995)

CHAPTER 1

Introduction

1.1 Scope

The focus of this report is an examination of the current market situation and the market opportunity for Alberta table potatoes in the British Columbia table potato market. Through examination of recent international and provincial production and trade flows, including trading regulations, restrictions and barriers (tariff and non-tariff), an assessment is attempted of the competitive position of Alberta table potatoes in the British Columbia market relative to competing suppliers. This assessment is intended to allow Alberta table potato producers and marketing representatives to assess prospects for Alberta's table potato industry in the British Columbia market.

The Canadian potato industry has a long history. While production occurs in all provinces of Canada, most is concentrated in the eastern regions of the country, mainly in New Brunswick and Prince Edward Island. In western Canada, Manitoba, Saskatchewan, Alberta and British Columbia all contribute to Canada's potato production. With one of the highest populations in Canada, British Columbia represents a large market for table potato producers in western Canada and the Northwestern United States. Recently however, concerns have been raised in the Alberta potato industry regarding market access to the large British Columbia market for Alberta table potatoes. A number of issues are important to the Alberta potato industry in addressing these concerns, including:

- The size of the British Columbia table potato market, indicating the potential volumes that theoretically can be shipped to that market;
- Alberta's competitive position in the British Columbia table potato market relative to competing suppliers' position, including Washington, Idaho, Oregon, and British Columbia;
- Buyer perceptions and/or preferences in British Columbia for table potatoes.

Examining each of these issues can provide the Alberta potato industry with information needed to assess the importance of the British Columbia market potential.

In today's market, table potato production and consumption are declining versus that of other types of potato products. For example, the production of table potatoes in Alberta has decreased 15 percent in the past decade, a pattern that has generally followed in other provinces. In the U.S., a similar pattern has been observed. In Alberta, the production of seed and processed potatoes has increased enough so that, on average, total Alberta potato production has been steadily rising.

This study examines the trade and trade policy aspects as well as the cost-competitive nature of the Alberta table potato industry with its competitors in the British Columbia table potato market. The issues involved are: (1) barriers to entry into the British Columbia market; (2) Alberta's advantage in accessing the British Columbia table potato market[1] and (3) cost of production differences between Alberta and its competitors, specifically the Pacific Northwestern (PNW) United States.

---

1 These 'advantages' may be a result of Canada-U.S. border restrictions, licencing fees, or domestic support (credit/financial, productive, marketing, technical, transportation or research).

The study also undertakes an assessment of the quality attributes that are desired in the British Columbia table potato market (i.e., size, colour, price and origin).

1.2 Objectives

The goal of the thesis is to examine selected forces that have limited the share of Alberta-grown potatoes in the British Columbia table potato market, and to assess the importance of these influences to table potato production in the Pacific Northwest of the United States.

The objectives of this research are:

1. To examine potential market opportunities for Alberta table potatoes in the British Columbia table potato market;
2. To assess the cost-competitiveness of Alberta's table potato industry. This includes comparing Alberta's variable production costs with other competing regions' such as British Columbia, Washington, and Idaho;
3. To identify possible trade flows and trading volumes based on the cost-competitiveness of the Alberta table potato industry, and to compare these to actual trade flows in order to draw inferences about the nature of existing hindrances to interprovincial trade in table potatoes;
4. To ascertain, using Stated Preference modelling, attributes of table potatoes desired by British Columbia wholesalers.

1.3 Organization of the Study

The study is organized as follows: First a background on potato production, trade, consumption and marketing is given in chapter 2. Chapter 3 explores the potato industries in western Canada and the Northwestern United States, focussing on the differences and similarities between the two regions. Chapter 4 reviews the policy and trade aspects of table potato production in the two regions, outlining the issues from a global to a provincial perspective. In chapter 5, a theoretical background to the research is provided. In chapter 6, Alberta's competitiveness in the British Columbia market is assessed from three perspectives; cost-competitiveness, market integration, and buyer preferences. The results and discussion of the empirical models are summarized in chapter 7, while examining marketing and policy implications. The final chapter also suggests areas for further research.

CHAPTER 2

Background

2.1 Production and Trade

Potatoes are temperate zone plants, usually grown in regions with long, cool summers. World potato production of table stock, seed and raw potato products for processing was 627 billion pounds (285 mmt) in 1996, representing an increase of 2.6 percent from 1992 (table 2-1). China was the major producer, accounting for 16 percent of total world production in 1996. The U.S. ranked fourth at 7.3 percent and Canada fourteenth at 1.3 percent in 1996.

Growers of table stock potatoes select certified seed potatoes of varieties which they believe to be adapted to their specific growing areas. Like other field-grown crops, potato production is directly affected by the vagaries of weather, along with specific cultivation, fertilization, rainfall/irrigation, and insect and disease control practices. The availability and timing of water may be the single most important factor affecting potato quantities produced and yield per acre (USITC 1997). With potato plants being heavy feeders of nutrients and the fact that certain soil-borne pest problems tend to remain in the soil for a few years after the plants have been harvested, potatoes are often grown in a 3 or 4 year rotation program with other crops such as barley, oats or flax. Pest control is an important part of potato growing. The use of integrated pest-management techniques is common throughout the Canadian and U.S. potato growing industry. With the added

environmental concerns facing agriculture today, growers are striving to design and implement management practices that maximize yields and efficiency, while minimizing the adverse effects on the environment and helping to sustain available soil and water resources (Potato Association of America 1993).

Table 2-1. World Potato[1] Production, 1992-1996

Country	1992	1993	1994	1995	1996	Change 1996 over 1992
	Quantity (mmt)					
China	37.8	45.9	48.8	45.8	46.0	22%
Russian Federation	38.3	37.7	33.8	39.9	41.5	8%
Poland	23.4	36.3	23.1	24.9	24.0	3%
U.S.	**19.3**	**19.4**	**21.2**	**20.1**	**20.8**	**8%**
India[2]	16.4	15.2	17.4	17.9	17.9	9%
Ukraine	20.3	21.0	16.1	14.7	16.0	-21%
Germany[2]	11.3	12.6	10.6	10.4	10.4	-8%
Belarus[2]	9.0	11.6	8.2	8.6	8.6	-5%
Netherlands[2]	7.6	7.7	7.2	7.4	7.4	-3%
United Kingdom[2]	7.8	7.1	6.4	6.0	6.0	-23%
France	6.7	5.9	5.5	5.8	6.0	-10%
Turkey[2]	4.6	4.7	4.3	4.8	4.8	3%
Spain	5.2	3.8	3.9	4.2	4.0	-23%
Canada	**3.6**	**3.3**	**3.7**	**3.8**	**3.9**	**8%**
All other	66.3	69.7	65.2	67.0	67.5	2%
total	277.6	301.9	275.4	281.1	284.7	3%

[1] includes potatoes for all uses

[2] data are estimated for 1996 based on 1995 levels

Source: USITC 1997 (table 1-1)

In Canada and the U.S., potatoes represent the majority of horticultural crop production. In 1995 potato farm cash receipts in Canada represented 2 percent of total agricultural cash receipts at a value of $124 million (Statistics Canada- CANSIM).

Canadian potato production occurs in all provinces, with approximately 47 percent of production occurring in the eastern regions of the country (figure 2-1). From 1992 to 1996, Canadian potato production increased by 8 percent— in 1997, production increased 2 percent from the year previous, to 4.2 mmt. Throughout the country, the trend has been a decrease in table stock consumption and an increase in processed potato consumption.

In the United States, potato production has emerged as a commercial, capital intensive enterprise. U.S. trends include an increase in farm size and yields per acre, specialization by area, and an increase in the production and consumption of potatoes used for processing. Between 1992 and 1996, U.S. potato production increased by 8 percent. In 1994 the U.S. harvested a record crop of 21.2 mmt.

U.S. potato production patterns have shifted in the last fifty years from the northeast and central states to the western U.S.[2] The PNW, including Idaho, Oregon and Washington, is currently among the leading potato-producing regions. From a geographic perspective, the PNW and western Canada play a big part in each others' potato trade (see figure 2-1).

In both the U.S. and Canada, there has been an increase in average farm size along with a decreasing number of potato farms. In their comparison of Canadian and U.S. farm structures, Zepp et al. recount that in the U.S., the number of farms reporting potato acreage decreased from 2.6 million in 1939 (at an average of 1 acre per farm) to 14,782 in 1987 (at an average of 88 acres per farm). In Canada, the number of farms reporting

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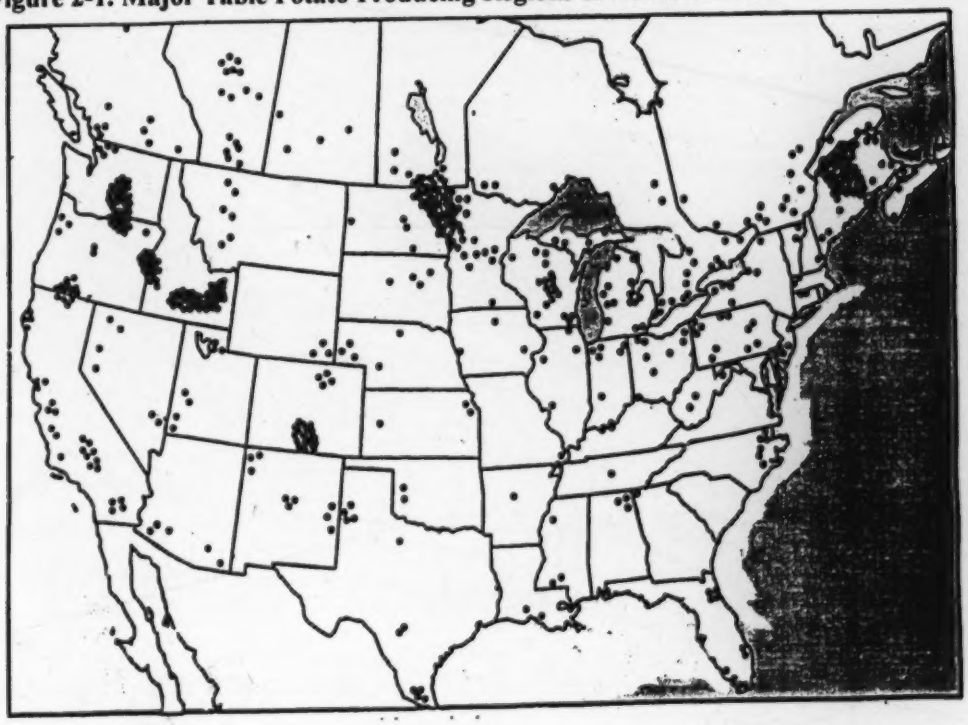
2 Presently, the western U.S. produces approximately 67 percent of total U.S. potato production, up from 23 percent in 1939 (Zepp et al. 1995).

potato acreage decreased from 217,137 in 1961 (at an average of 1.4 acres per farm) to 4,885 in 1986 (at an average of 56 acres per farm). In terms of industry size, Canada is much smaller than the United States.

Figure 2-1. Major Table Potato Producing Regions of North America



Source: USITC, 1997.

Trade flow of potatoes between the U.S. and Canada is generally accomplished without incident. Governed by the North American Free Trade Agreement (NAFTA), table potato trade between the U.S. and Canada takes place under few trade restrictions. Potato trade between Canada and the U.S. is highly regional, with primary flows being

north-south in direction[3]. Canadian exporters do face challenges such as perishability, seasonality, phytosanitary barriers and strong competition from U.S. producers. However, as U.S. producers look offshore to increase their export markets, opportunities can emerge for Canadian suppliers to backfill during the late season.

2.2 Consumption

North American consumption patterns in potatoes, as in most agri-food products, are changing. These changes are a consequence of changes in (1) eating habits (people are eating out more often and buying prepared products), (2) incomes, (3) education, (4) time constraints and (5) ethnic mix. The decline in table potato consumption in recent years is believed to be due to these five factors. Serecon (1998) suggest four issues directly related to the table potato consumption trend:

- The shift to convenience
- More diverse foods
- Change in retail structure
- Tastes and preferences of immigrants

The way people consume food has changed and as a consequence, so has agriculture. Large supermarkets are bulk-purchasing agricultural produce to sell wholesale to the consumer. More people are eating prepared goods, and goods with

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3 For example, in the Northwestern U.S., potato trade flows are mostly north into British Columbia, while in the Northeastern U.S., flows are primarily south through Maine and New York from New Brunswick, Prince Edward Island and Quebec.

easier, more convenient packaging (for example, french fries). This shift to convenience-oriented eating may cause consumers to buy the "already prepared" potatoes over the "preparation needed" potatoes (i.e., table potatoes). In 1997, 140 Alberta potato growers planted over 27,000 acres to commercial potatoes and harvested approximately 400,000 tonnes. More than half of the potatoes grown were used for processing— french fries, hash browns, chips and instant potato products (of which most are headed for export markets in Mexico or Asia). Only around 20 percent of the potatoes are destined for the table market.

The change in the retail structure is indicative of the vertical integration in fast food chains in order to supply and distribute at lower costs and ensure consistent supply. The companies in the distribution process are large and focussed on economies of scale, buying produce from large producers that can supply nationally and dictate quality control standards. As a result, the companies in the distribution process are willing to bypass local production if it is unable to meet their requirements on a national basis.

The tastes and preferences of immigrants affects table potato consumption in Canada.[4] While a native Canadian may treat potatoes as a staple good, an Asian immigrant, or even an Asian-Canadian may, in most cases, substitute the potato with rice for example. In fact, a small, limited assessment of Asian-Canadians reveals that an average person of Asian ethnicity will consume one-quarter of the table potatoes that an average non-Asian Canadian would consume. Thus consumption on a per capita basis, in

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[4] Personal conversation with J. Shimek. Agriculture and Agri-Food Canada, Market and Industry Services Branch.

those Canadian provinces with high Asian populations is substantially affected. As a result, the continued influx of Asian-origin immigrants, particularly from Japan into British Columbia over the last decade, has played a role in the decline of table potato consumption in Canada[5]. For example, in British Columbia, approximately 13 percent[6] of the population is of Asian ethnicity. Taking into account that these 500 thousand people (and growing) will only consume one-quarter of an average Canadian's table potato consumption, this consumption trend reveals an important factor in determining the market size for table potatoes in British Columbia. These issues are further examined in section 6.1.

2.3 Marketing Potato Products

The marketing structures for the Canadian and U.S. potato industries are in many ways quite similar. In both countries, potatoes are marketed through three supply chains: seed markets, table stock markets, and processing markets (figure 2-2). The flow of potatoes to the seed and processing markets depends mainly on the variety involved, and the size, shape and colour of the potato. For example, most round potatoes used for processing (usually white or red) will be used to make potato chips, while most non-round (oblong)

5

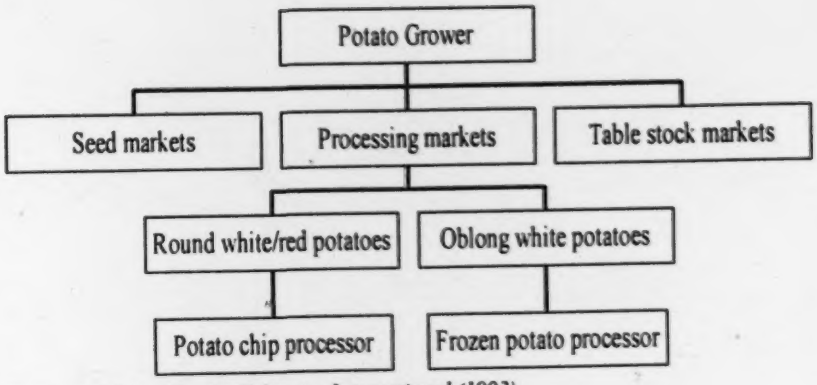
The views presented here suggest that recent past estimates of table potato consumption by the Canadian Federal government are misleading in that they do not take into account the tastes and preferences of all Canadians by omitting variables such as ethnic origin when calculating per capita table potato consumption. Estimates embodying ethnic origin are given in Appendix I.

6

Statistics Canada. 1995 "Ethnic Origin-The Nation" Catalogue 93-315; "Annual Demographic Statistics, 1995" Catalogue 91-213.

potatoes will be used to make frozen potato products.

Figure 2-2. Market Opportunities Available to the Potato Grower



Source: Deloitte Touche Tohmatsu International (1993)

The general structure of the table potato supply chain is presented in figure 2-3. Table potato growers in general have three avenues to which to sell their product (four, if keeping the product on the farm is included). Two of the avenues, marketing boards and wholesalers, imply that packaging is done on farm. The third option available to the producer is to sell his/her product to a packer, who in turn may choose to sell to one or more retailers.

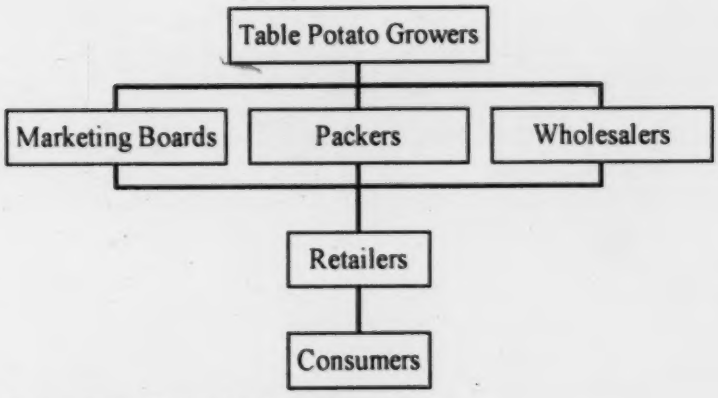
2.4 Summary

In 1996, Canada and the U.S. accounted for 1.4 and 7.3 percent, respectively, of total world potato production. Production patterns in the two countries are regional, with trade flows following the same route. In Canada, most potatoes are produced in the

eastern provinces, with trade flows being north to south. In the U.S., the northwestern states of Washington, Idaho and Oregon have become the major potato producers, with trade flows being primarily south-north in direction. British Columbia accounts for much of these PNW imports.

Consumption patterns of potatoes in recent years have shifted from table to process uses. Last year in Alberta for example, only 20 percent of the potato harvest was destined for the table market. In part, this consumption trend can be attributed to shifts in consumer preferences (convenience goods and more diverse foods), a change in the retail structure and the growing importance of the tastes and preferences of immigrants. From July 1996 to June 1997 alone, over 147,000 people immigrated to Canada from Asia, bringing with them diverse tastes and preferences for Canadian food products.

Figure 2-3. Structure of the Table Potato Industry



Source: Discussions with industry by author.

CHAPTER 3

The Potato Industry in Western Canada and Northwestern United States

3.1 The Canadian Industry

Potatoes represent the majority (40 percent) of vegetable production in Canada (Vandenberg and Parent 1997). The relative importance of potatoes to farm cash receipts varies from region to region in Canada. For Canada as a whole, the importance of the potato crop has been increasing in value and as a percent of farm cash receipts. Between 1985 and 1995, potatoes averaged between 1.3 and 2+ percent of total national agricultural cash receipts (Statistics Canada- CANSIM 1996). From 1990 to 1995, potato farmers in Canada received an average on-farm price of 7.6 cents per pound for their product. The total farm value for Canadian potato farms averaged slightly over $480 million over the same period.

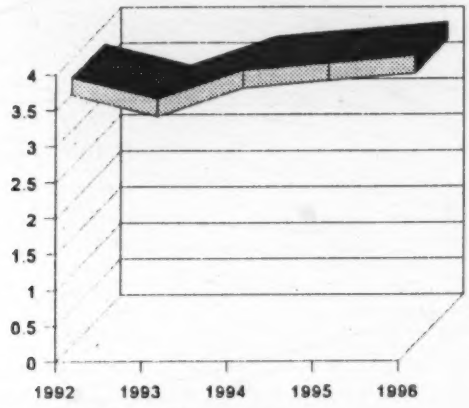
In the 1990's, Canadian potato acreage has averaged approximately 320,000 annually, with production averaging approximately 3.4 mmt per year (Statistics Canada-CANSIM). Total Canadian potato production (for all uses) decreased by 8.8 percent in 1993, as poor weather conditions caused national production to fall from 3.6 mmt in 1992 to 3.3 mmt in 1993. However 1996 production increased to 3.9 mmt (see table 3-1). Slightly over 354 thousand acres were used to grow the 1996 crop. In 1997, Canadian potato production increased another 2 percent over 1996 levels to a record 4.2 mmt. 1997 was the fourth consecutive record year for potato production in Canada. One

reason for this is that the capacity for seed potato exports to foreign countries has allowed seed producers to expand production.

Figure 3-1 and 3-2 reveal increasing Canadian potato production and Canada's share of world potato production, respectively from 1992 to 1996. Similar increasing trends in Canadian potato area harvested, and Canada's share of the world's harvested acreage are revealed in figures 3-3 and 3-4 respectively.

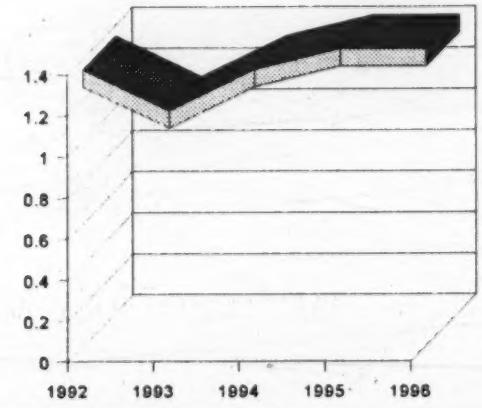
Canadian potato production occurs throughout the country (recall figure 2-1), with about 47 percent of Canadian production taking place in the eastern region of the country, namely New Brunswick and Prince Edward Island. The central region of Canada accounts for approximately 20 percent of national production, while the remaining 32 percent takes place in the western region (table 3-1). In Canada, industry sources estimate that nearly one-half of potato production is for the processed market. Of that, about 40 percent of Canadian output is processed into frozen french fries and other frozen potato products, while approximately 10 percent is processed into potato chips. Figures 3-1 and 3-2 clearly show the dip in Canadian production and Canada's share of world production, respectively, in 1993. Canada's share of world production has been between 1 and 1.4 percent since 1992. Canadian harvested acreage and share of world harvested acreage has been steadily increasing since 1992, as revealed in figures 3-3 and 3-4 respectively. Canada's share of world harvested acreage has averaged 0.7 percent since 1992.

Figure 3-1. Canadian Potato Production, 1992-1996 (units: mmt)



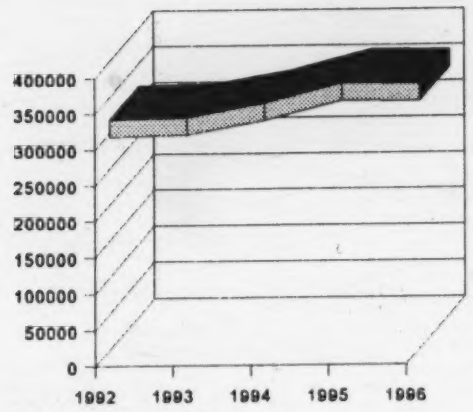
Source: USITC 1997, page 4-1

Figure 3-2. Canadian Share of World Potato Production, 1992-1996 (units: percent)



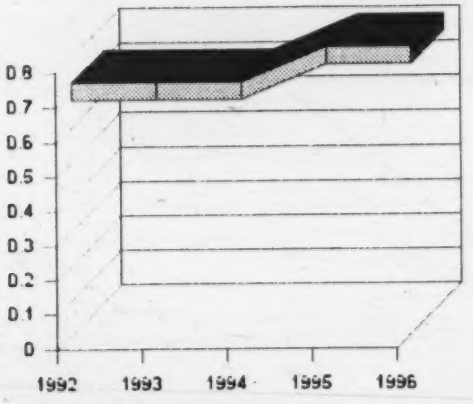
Source: USITC 1997, page 4-1

Figure 3-3. Canadian Potato Harvested Area, 1992-1996 (units: acres)



Source: USITC 1997, page 4-1

Figure 3-4. Canadian Share of World Harvested Potato Acreage, 1992-1996 (units: percent)



Source: USITC 1997, page 4-1

Table 3-1. Provincial Share of Canadian Domestic Potato[1] Production, 1996

Province	metric tonne	share
Eastern Region	*1,870,011*	*47%*
Prince Edward Island	1,179,360	30%
Nova Scotia	53,570	1%
New Brunswick	637,081	16%
Central Region	*779,421*	*20%*
Quebec	465,076	12%
Ontario	314,345	8%
Western Region	*1,264,047*	*31%*
Manitoba	750,164	19%
Saskatchewan	55,294	1%
Alberta	364,785	9%
British Columbia	93,804	2%
Total	**3,913,479**	

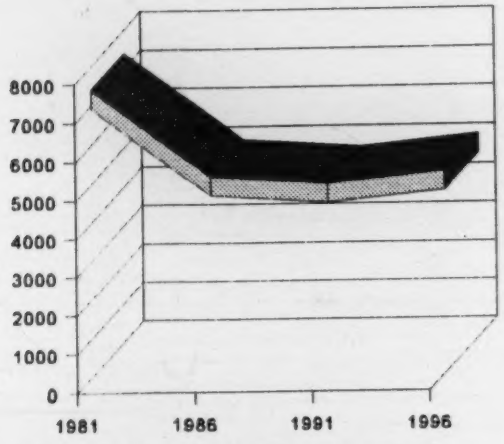
[1] includes potatoes for all uses

Source: Statistics Canada- CANSIM

Figure 3-5 reveals the trend in the number of potato farms in Canada, while figure 3-6 shows the trend of increasing farm size, as collected from Statistics Canada Census overviews of Canadian agriculture. From 1981 to 1991, the average number of potato growers in Canada declined from 7,139 with 272,728 acres planted in 1981 to 4,692 with

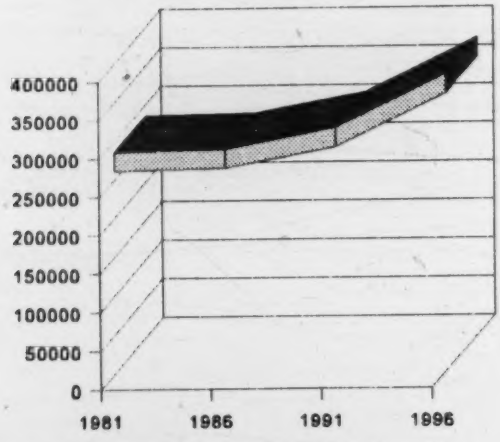
302,435 acres planted in 1991. As an exception to this trend, the number of farms increased in 1996 to 4,989 with 371,441 acres planted.

Figure 3-5. Number of Potato Farms in Canada, Selected Years



Source: Statistics Canada, *Census Overview of Canadian Agriculture: 1971 to 1991* and *Census Overview of Canadian Agriculture 1996*

Figure 3-6. Potato Acreage Planted in Canada, Selected Years (units: acres)



Source: Statistics Canada, *Census Overview of Canadian Agriculture: 1971 to 1991* and *Census Overview of Canadian Agriculture 1996*

3.1.1 *The British Columbia and Alberta Industries*

More potatoes are grown in British Columbia than any other vegetable, with potato production concentrated in the Lower Mainland, on Vancouver Island and in the Okanagan and Kootenay areas. In 1995, British Columbia producers planted 5,400 acres of table potatoes, 1,300 acres of process potatoes and 2,125 acres of seed potatoes. Harvested production on those acres was 65,092 tonne, 19,051 tonne and 18,144 tonne of table, process and seed potatoes respectively (British Columbia Ministry of Agriculture, Fisheries and Food 1995).

Potato production in Alberta takes place throughout the province, with the majority of the acreage in the irrigated areas of Lethbridge, Taber, Vauxhall and Bassano-Brooks. The dryland areas of Alberta such as Edmonton and Lacombe also account for considerable acreage. Depending on the seed that has been planted, the final product will take on many different shapes, sizes and colours. Common group types include russets, reds, whites, and yellow-fleshed, while common variety groups include Russet Burbank, Norland, Superior and Yukon Gold. The main varieties of table potatoes produced are Russet Burbank, Russet Norkotah, Red Norland, Yukon Gold, Bintje, Superior, and Carlton. Acreage devoted to table potatoes in Alberta declined from 1990 to 1995. This was due, in part, to increased production of seed potatoes for the United States market, and to increased production (but not acreage) of process potatoes. For example, seed acreage in Alberta increased 31 percent from 1990 to 1995, while production of seed potatoes increased 41 percent over the same period. Table potato production declined 15 percent from 1990 to 1995.

The PGA estimated[7] that the province's 140 growers would grow approximately 28,000 acres of potatoes in 1997. About 52 percent would be for processors, 27 percent for the seed industry and the remainder would go to the table stock market.

The average farm price and total farm value for potato farms in both British Columbia and Alberta from 1990 to 1993 reveals that Alberta's average farm price falls below that of British Columbia. Although limited data are available, past estimates show that the total farm value of production in Alberta exceeds that of British Columbia (table 3-2).

One measure of the importance of potato farming in British Columbia and Alberta is the percentage of each province's potato farm cash receipts to the total farm cash receipts of that province. Over the period 1985 to 1995, potato receipts as a percent of total receipts in British Columbia averaged 2 percent. In Alberta, the equivalent figure is 0.9 percent.

Though Canada is a net exporter of potatoes, the Alberta industry has not traditionally been self sufficient. Through increased efficiencies in production and marketing, Alberta is becoming more of an exporter, rather than an importer of potatoes.[8] British Columbia and Alberta are small exporters of table potatoes internationally. Chapter 4 will further discuss the trade patterns of table potato exporters in Canada and the provinces.

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7 *The Common Tater*. Official Publication of the Potato Growers of Alberta. May, 1997.

8 For example in 1996, Alberta became a net exporter of potatoes and industry officials expect this trend to continue.

Table 3-2. Average Farm Price and Total Farm Value, Alberta (AB) and British Columbia (BC), 1985-1994

	Average Farm Price C$ / cwt		Total Farm Value C$'000	
	AB	BC	AB	BC
1985	4.75	5.52	22,230	11,658
1986	5.25	7.69	27,074	15,394
1987	7.31	12.23	41,432	22,151
1988	7.25	12.22	42,184	17,416
1989	7.86	14.15	46,824	26,312
1990	8.4	14.53	51,011	17,994
1991	6.66	12.86	35,656	23,156
1992	8.66	11.44	46,561	22,134
1993	9.07	14.21	59,314	24,054
1994	7.63	14.73	n/a	n/a
Average	***7.28***	***11.96***	***41,365***	***20,030***

Source: Statistics Canada - TIERS

The Alberta potato industry is comprised of one-hundred forty growers, ten packing companies and seven processing facilities (PGA, 1996). Compared to Washington, Alberta's U.S. counterpart, the Alberta potato industry is small.

3.2 The United States Industry

In the United States, potato production has emerged as a highly commercial, capital intensive enterprise (Zepp et al. 1995). In 1994, cash receipts from potato farms represented over U.S.$2.5 billion. The trend has included an increase in farm size and yields per acre, specialization by area, and an increase in the production and consumption

of potatoes used for processing (Zepp et al.). In both the U.S. and Canada, there has been an increase in average farm acreage (recall figure 3-6) along with a decreasing number of potato farms (recall figure 3-5).

In the United States, the production of table potatoes has increased in the past few years, from 19.3 mmt in 1992 to 22.6 mmt in 1996, an increase of 17 percent. Production patterns have shifted in the last fifty years from the northeast and central states to the western U.S.

3.2.1 *The Pacific Northwestern U.S. Industry*

The Pacific Northwestern states are currently among the leading potato-producing states in the U.S. (recall figure 2-1). With potatoes, the soil type, day length and available water supply can limit the locations where commercial potato production can exist. On a regional basis, the production area in the western states of Idaho, Oregon and Washington is described as ideal for potato cultivation due to warm days, cool nights, loose, well drained soils of volcanic ash and optimum nutrient levels, extensive irrigation capabilities, low daily humidity and a growing season upwards of 160 days (Lamb-Weston 1994).

In 1995, 48 percent of all potatoes grown in the United States were of Russet Burbank variety, which was the number one ranked variety planted that year. In the three PNW states, the main varieties planted in the last three years, in order of percentage planted, were Russet Burbank, Shepody, and Russet Norkotah. In 1995, Idaho, the U.S.'s largest potato producing state, planted 83 percent of its seed in Russet Burbank variety (USDA - ERS 1997).

Of the top ranked potato-producing states in the U.S. for the period 1985 to 1994, Idaho, Washington and Oregon rank 1, 2 and 7 respectively (USDA - NASS 1997). In the last few years, Idaho has maintained or increased production as well as average price received by farmers, whereas both Oregon and Washington states have shown slight decreases in production and average farm price.

In 1994, the three PNW states represented 69 percent of total U.S. potato farm cash receipts. As such, potato farming in the northwestern states represents a significant amount of revenue for the U.S. economy.

Table 3-3 reveals the area, production and price received by farmers in the PNW from 1993 to 1995. This limited data set reveals an increase in both production and price in Idaho, whereas both Oregon and Washington states showed slight decreases in both production and price. As with most potato farms in Canada and the U.S., environmental conditions like weather have had strong impacts on seasonal potato yields.

3.3 Summary

Potato farming in Canada has existed for many years. Like many other farming sectors, the number of farms reporting potato acreage has decreased over the years, while acreage per farm has increased. Historically, potatoes have been grown in Canada to meet the table market. In recent years however, the consumer trend toward convenience goods has seen an increase in the amount of potatoes grown for the processing sector. Although the table market has declined, the demand for value-added potatoes has caused an overall increase in potato production— and consumption— over the past few years.

Table 3-3. Potatoes— Area, Production, and Marketing Year Price Received by Farmers in the Pacific Northwestern United States (1993-1995)

	IDAHO			OREGON			WASHINGTON		
	1993	1994	1995	1993	1994	1995	1993	1994	1995
Area harvested (1000 acres)	388	408	398	49.4	55.8	51	150	152	147
Production (1000 cwt)	126,192	138,801	131,274	22,103	27,514	23,780	88,500	88,920	80,850
Price for crop (U.S.$/cwt)	4.65	4.95	n/a	5.53	4.86	n/a	5.3	4.75	n/a

Source: USDA - ERS, 1996

Prince Edward Island, Manitoba, and New Brunswick are the major potato-producing provinces in Canada. Alberta and British Columbia accounted for 9- and 2-percent, respectively, of total Canadian potato production in 1996.

In the 1990's, table potato production in the United States has increased by approximately 17 percent. With one of the largest domestic food markets in the world, the trend that has seen table potato production decrease in recent years in Canada, is not as evident in the U.S. The U.S. market however, has followed similar trends seen in Canada such as decreasing number of potato farms and increased farm size, as well as a shift toward the value-added potato products.

Production in the U.S. has shifted from the eastern states to the western states of Washington, Oregon, and Idaho. Maine is also a large producer of potatoes, but has to compete with the large potato producing provinces of PEI and New Brunswick.

CHAPTER 4

Policy and Trade

4.1 Agriculture Policy in World Potato Markets

On April 15, 1994, the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) was formally concluded after nearly seven and a half years of negotiations. Currently there are 132 member countries which comprise the GATT (now known as the World Trade Organization, or WTO). Through the creation of a more stable environment for trade and investment, the Uruguay Round Agreements (URAs), and in particular the Agreement on Agriculture (AoA), is expected to result in a significant boost to world trade, economic growth and employment.

4.1.1 *The Main Elements of the Agreement on Agriculture*

As a result of the Uruguay round, agriculture has been brought under GATT disciplines for the first time through the AoA. The objective of the AoA is to reform trade in the sector and to make policies more market oriented. The AoA establishes commitments on member countries in the areas of market access, domestic support, export competition along with a separate protocol on sanitary and phytosanitary measures. The AoA is being implemented over a six year period (ten years for developing countries), which began on July 1, 1995 and will continue through to December 31, 2000. Participants have agreed to initiate negotiations for continuing the reform process at the end of 1999. The key

provisions of the AoA are market access, domestic support and export subsidies. The market access provisions of the AoA include:

- Conversion of non-tariff barriers (NTBs) to tariff equivalents (TEs) based on the difference between average 1986-88 internal prices and world market prices (this process is known as tariffication).
- Binding of all tariffs and TEs and reduction of these TEs and ordinary tariffs over 6 years (10 years for developing countries, or DCs) by an average of 36 percent (24 percent for DCs) with a 15 percent (10 percent for DCs) minimum cut per tariff line.
- Where import access currently exceeds 5 percent for products covered by NTBs, current access opportunities must be maintained, however members have the option of aggregating across some product groups for purposes of fulfilling minimum access requirements.
- Establishment of minimum access commitments for commodities: the guidelines are 3 percent of 1986-88 consumption, rising to 5 percent.

The domestic support commitments include:

- Measurement of Domestic support through the "Aggregate Measure of Support" (AMS) aggregated across all commodities and calculated from a 1986-88 base.
- Reduction of AMS in equal annual installments by 20 percent by the year 2000.
- DCs must reduce AMS by 13 percent by the year 2005.
- The least developed countries (LDCs) cannot exceed AMS established in 1986-88.

Finally, the export subsidy commitments include:

- Reduction of budget expenditures for export subsidies by 36 percent (24 percent for DCs) over a six year implementation period (ten years for DCs) from a 1986-90 base.
- Reduction of quantities exported with subsidies by 21 percent (14 percent for DCs) over six years from a 1986-90 base.
- Reductions made in equal annual installments on a commodity-specific basis from the 1986-90 base, or from average 1990-91 levels if higher than the base period.

4.1.2 *Impacts of the Uruguay Round Agreement on World Fresh Vegetable Trade*

The potential for an increase in the volume of international trade in fresh vegetables as a group as a result of the market access aspects of the Uruguay Round Agreement is not substantial (Organization for Economic Cooperation and Development 1995). The Uruguay Round agreement on domestic support commitments is expected to have little impact on trade and prices in vegetables because of the limited domestic support for vegetables in the various countries and because the AMS is to be calculated on an aggregate commodity basis (Organization for Economic Cooperation and Development 1995). As far as the commitments to reduce export subsidies are concerned, the European Union (EU), and countries such as Norway and Switzerland, where exports of fresh vegetables are subsidized, will require large cuts over the course of the six year period. For other countries whose aggregate export subsidies are lower, cuts will also be required, but the overall impact on volumes of their exports of fresh vegetables is likely to be less significant (Organization for Economic Cooperation and Development 1995).

Overall, the Uruguay Agreement is not expected to result in any substantial change in world trade of potatoes. Usually fresh vegetable trade is based on seasonal climatic advantages which are often reinforced by (import) tariffs and tariff quotas. Trade in potatoes is mainly regional, and countries in these regions have, in some cases, already agreed to implement bi- or plurilateral trade agreements on reducing import tariffs. For example:

- the U.S. imports a large volume of vegetables from Central American countries to which the Caribbean basin Initiative tariffs are applied;
- the EU imports vegetables mainly from the Mediterranean and Eastern European countries which take advantage of low tariffs under regional trade agreements, and finally;
- vegetable trade between Mexico, the U.S. and Canada is conducted under the North American Free Trade Agreement.

4.2 Domestic Policy in the North American Potato Industry

In both the U.S. and Canada, governments provide assistance programs at different levels to try to directly or indirectly affect their respective potato industries in the table, process and seed sectors.[9] Some of the federal programs for potatoes in the U.S. include export and market development programs, market support and regulatory programs, crop

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9 Reference material for this section includes foremost a study conducted by the United States International Trade Commission in July of 1997 concerning competitive conditions affecting the U.S. and Canadian fresh and processed potato industries, as well as pre- and post-hearing briefs submitted to the Commission for use in their investigation.

insurance, disaster assistance, research and extension, irrigation assistance through the Bureau of Reclamation and financial assistance for rural businesses. In Canada, assistance programs affecting potato growing and processing include income safety net programs, crop insurance, regional and economic development programs, production financing and credit programs, research, and export marketing assistance. Many federal Canadian assistance programs are administered with the provinces through cost-sharing arrangements between the federal and provincial governments (United States International Trade Commission 1997).

In the U.S., many agricultural support programs affecting potato growers and processors at the federal level act to enhance the long-run competitiveness of the potato industry. In their study, the United States International Trade Commission (USITC) summarized a number of these programs. For example, farm-level programs include crop insurance, farm disaster/emergency assistance, credit/financial assistance, rural development, irrigation infrastructure, marketing assistance/promotion, research, extension, and information services, plant quarantine and protection, as well as production assistance or tax incentives. Infrastructure, processing/ agribusiness assistance includes rural development funding, research and market promotion programs, and financial assistance.

In Canada, government officials attempt to target assistance programs to potato growers and processors in order to enhance the competitive position of the industry. As the USITC (1997) describes, Canadian programs are either producer funded, paid for through cost-recovery measures, or provide non-specific support. Some examples are

Farm-level programs like Income support, Crop Insurance, Credit assistance, direct loans, loan guarantees, Land lease/ purchase programs, Irrigation infrastructure /crop development/ water supply, Extension/ training. Agricultural Research Programs include Research and demonstration programs benefiting agricultural producers and agribusinesses, Programs providing grants to individuals, businesses and organisations for adaptive research, market studies, marketing, and industry development. Transportation assistance programs also help to increase the competitiveness of provincial potato industries through programs such as Rail and truck rate assistance within Atlantic Canada such as the Atlantic Region Freight Assistance Act (ARFAA) and the Maritime Freight Rates Act (ended fiscal year 1995-96). Processing/agribusiness assistance initiatives include Wage assistance programs, Loans/ other assistance for storage and packing operations, processor loans and grants, contributions for wastewater treatment and infrastructure, and other assistance.

The Canadian Horticultural Council (CHC) was established in 1922 as a not-for-profit organisation operating under the federal charter. The Council represents the majority of the horticultural producing sector across Canada and is dedicated to the principle of developing industry consensus on issues as they are identified (Cameron and Hornbostel 1997). The Council makes policy decisions based on reports it receives from seven Standing Committees which can be passed on to federal authorities.

4.3 Domestic Potato Policy in Canada

There are several Federal-Provincial programs focussed on international markets for

Canadian potatoes. Government programs pertaining to potatoes are of four main types: marketing assistance, production assistance, employment laws and tax laws. The policies most pertinent to this study are those related to marketing assistance. Marketing assistance programs or Acts for potatoes in Canada include the Economic and Regional Development Program, the Consumer Packaging and Labelling Act and Regulations, the Canada Agricultural Products Act (CAPA), and the Program for Export Market Development (Zepp et al.).

4.3.1 *Federal Marketing Programs for Canadian Potato Growers*

Authority for public involvement in potato marketing is derived from Section 95 of the Constitution Act, which allocates legislative powers for agriculture to the federal government and the provinces.[10] At the federal level, the policies which pertain mostly to horticultural products are the Agricultural Products Marketing Act (APMA), and the CAPA.

The APMA deals with marketing of agricultural products in inter-province and export trade. It confers federal authority concerning inter-province or export trade to provincial marketing boards or commissions. Authority is granted as a result of a request by a province. The individual boards or commissions are given the authority to exercise the certain federal powers such as those related to pricing, transportation (which includes shippers, packing, and storage) and marketing (which includes appointing sales agents, licensing, and levies on production and/or sales).

Regulation of marketing of agricultural products in import, export, and

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[10] For more detailed information, see: Canadian International Trade Tribunal (CITT). 1991. *An Inquiry into the Competitiveness of the Canadian Fresh and Processed Fruit and Vegetable Industry.*

international trade, as well as providing for national standards and grades of agricultural products, is the focus of the CAPA.[11] The CAPA also provides for inspection, grading, registration of establishments, and standards governing establishments for Canadian agricultural products. The CAPA is administered by Agriculture Canada. Some provinces, Alberta and British Columbia included, have their own similar legislation which incorporates federal standards, but may be more rigid than the provisions in the federal statute. Such standards may act as inter-province trade barriers (Canadian International Trade Tribunal 1991).

Regulation of fresh and processed vegetable marketing is conducted by the Fresh Fruit and Vegetable Regulations (FFVR), the Licensing and Arbitration Regulations, and also by the Processed Products Regulations (PPR). Through prescription of preliminary standards for health and safety, quality (grades), packaging, labelling, and marketing of these products is facilitated.

As described in the Canadian International Trade Tribunal's (CITT) study, the Regulations for Fresh Fruit and Vegetables, which include standards for grades, labelling, packaging, and health, apply to inter-province trade as well as to imports and exports. Produce that has been prescribed a grade standard, under the regulations, cannot be imported in bulk form. With a valid federal produce license, an exemption from the bulk import prohibition may be obtained for products that are to be re-packed or processed.

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[11] Agriculture and Agri-Food Canada. March 1995. Report to the Ministers on the Impacts of the Canada Agricultural Products Act's Ministerial Exemption Provisions of the Fresh Fruit and Vegetable and Processed Products Regulations on Interprovincial and International Trade.

An exemption can only be obtained if the receiver contacts an industry representative (marketing board, for example) in the receiving and neighbouring provinces. The marketing board would respond to the receiver, either agreeing or disagreeing to the bulk import shipment. After submitting a request to Agriculture Canada (which reviews the request and the marketing board's response) the receiver will receive a response in writing from Agriculture Canada. However, prior approval is needed to facilitate inter-province and import trade in this way.

Since the beginning of the century, the Fresh Fruit and Vegetable Regulations have been involved with promoting orderly marketing. Only in the past few decades has there been some form of exemption process for these regulations. The Licensing and Arbitration Regulations addressed under the CAPA are designed to promote fair and ethical trade practices in inter-province and international trade of fresh produce, and to attempt to ensure that a producer will be paid for his/her produce (CITT 1991).

If processed potatoes are being exported or imported across provincial boundaries or internationally, the products must meet prescribed labelling, packaging, compositional, as well as minimum quality standard specifications set by the PPR under the CAPA. The types of processed potatoes covered by the PPR include white potatoes (whole, sliced, diced, cubed, Julienne, shoestring, regular cut, and crinkle cut), sweet potatoes (whole or cut), and frozen french fried potatoes (straight or regular cut, shoestring or Julienne, and crinkle cut Julienne). Fresh or processed products that are produced and sold within a province are not categorised under either set of regulations (FFVR or PPR). These fall under provincial jurisdiction.

The Farm Products Marketing Agencies (FPMA) Act permits the National Farm Products Marketing Council to advise agencies which administer national and regional marketing plans. This allowance for the producer-developed national or regional marketing plans is one role of the FPMA Act.

4.3.2 *Provincial Marketing Programs for Canadian Potato Growers*

Intra-province trade in horticultural products takes place under provincial jurisdiction. Canadian provinces have enacted legislation concerning the promotion, control, and regulation of production, transportation, packaging, storage and marketing of agricultural products (CITT 1991).

In Alberta, the Alberta Marketing and Agricultural Products Act provides for the establishment of provincial marketing boards which are, for the most part, run by producers for producers. These boards are supervised by the Provincial Agricultural Products Marketing Council, whose main purpose is to enable, motivate and assist agricultural commodity groups to grow and develop domestically and internationally through co-operation (CITT 1991).

Vegetables in Alberta are marketed through three boards and two associations who represent growers' interests. The three boards are the Potato Growers of Alberta (PGA)[12], the Alberta Fresh Vegetable Marketing Board[13], and the Alberta Vegetable Growers' Marketing board. The two associations include the Alberta Greenhouse Growers' Association, and the Alberta Market Gardeners' Association.

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[12] For more detailed information, see PGA. 1996 Industry Update. Calgary.

[13] As of June 5, 1997, the activities of the Alberta Fresh Vegetable Marketing Board have been suspended, after the 7-member board of directors resigned. While the Board continues to exist on paper, its office is closed and its regulatory authority will be lifted.

The PGA is a regional marketing board that deals with promoting the industry, and maintaining a minimum price on all (except processed) potatoes at the farm gate sold in Alberta. The mission of the PGA is to create success in Alberta's potato industry supporting sustainable production, marketing, development, and co-operation (PGA, 1996). Other marketing organizations at the provincial level in Alberta for potatoes include Edmonton Potato Growers Inc., a producer-owned marketing company, and the Alberta Seed Potato Growers' Association.

In British Columbia, the Natural Products Marketing Act provides for the promotion, production control, transportation, packing, storage, and marketing of natural British Columbia products, and creates marketing boards which administer regulations for the marketing of regulated products (CITT 1991).

The Natural Products Marketing Act constitutes the British Columbia Marketing Board (BCMB). Concerning potatoes, the BCMB supervises the British Columbia Vegetable Marketing Commission, which has become the most important of the five boards that the BCMB supervises. The Commission is authorised to promote, control, and regulate the production, transportation, packing, storage and marketing of vegetable products, including both table and processed potatoes, provincially, inter-provincially, and for export under the APMA (CITT 1991).

All regulated potato products being shipped into British Columbia, or through British Columbia to the United States, must first be graded and packed in approved containers. In British Columbia, the movement of potato products requires transport permits. Any shipper/driver from Alberta for example, must obtain a British Columbia shipping permit upon entry to the province, whether the potatoes are destined for British Columbia, or are being moved through British Columbia into the United States.

4.4 Trade Policy in North American Potato Markets

The substantial amount of vegetable trade captured in the potato sector facilitates the examination of the policy provisions and implications of table potato trade in North America. Presently, there is a joint Canada-U.S. Potato Council set up for the Canadian and U.S. potato industries. The council examines issues and shares information to find areas of agreement on international potato trade, ensuring that programs and policies are clear and do not negatively affect trade (Zepp et al.).

As mentioned earlier, vegetable trade between Mexico, the U.S. and Canada is governed through the North American Free Trade Agreement. The 1994 NAFTA encompasses the 1989 bi-lateral agreement between Canada and the U.S. known as the Canada-U.S. Free Trade Agreement (CFTA) and expands the CFTA to include Mexico as a third trading partner. The treatment of tariffs/ tariff-rate quotas (TRQs) for table potatoes as negotiated under the NAFTA is summarized in table 4-1 for the U.S. and Canada, and in table 4-2 for Mexico.

As table 4-1 shows, table potato trade between the U.S. and Canada currently takes place with few trade restrictions. Further, as negotiated under the CFTA, restrictions on table potato trade between the U.S. and Canada are reduced as of January 1, 1998. In addition to tariffs shown table 4-1, British Columbia has imposed antidumping duties on imports of table potatoes from Washington, Oregon, California and Idaho since 1984. The antidumping duties vary based on the difference between a calculated "normal value" and the export price for various varieties, packs and sources (USITC 1997).

For market access for table stock potatoes under NAFTA, Mexico converted an import licensing system to a transitional, ten year TRQ. Table 4-2 reveals the initial within-quota amount for U.S. exports of table stock potatoes at 15,000 metric tons (mt), and the amount for Canada at 4,000 metric tons. The within-quota amount increases by 3 percent annually.

The over-quota quantity, both from the U.S. and Canada was dutiable at $354 per metric ton, but not less than 272 percent ad valorem. An aggregate 24 percent of the over-quota tariff is being eliminated during the first six years of the Agreement, while the remainder will be phased out over the rest of the ten year transition period (USITC 1997).

Table 4-1. Canada-U.S. Table Potato Tariffs

Country	Base rate	Rate as of Jan.1 1998
U.S.	0.77 cents /kg	free
Canada	$7.72 /mt	free

Source: Harmonized Tariff Schedules of Canada and the U.S. 1997

Table 4-2. Mexican Table Potato Tariff Rate Quotas

Country	Initial within-quota amount	Over-quota quantity
U.S.	15,000 mt	$354 /mt; not < 272% ad valorem
Canada	4,000 mt	$354 /mt; not < 272% ad valorem

Source: NAFTA. Annex 302.2. Schedule of Mexico

To put real-world figures to these regulations, the USITC estimated that in 1996, Mexico allocated the U.S. a TRQ of 15,914 metric tons and 4,244 metric tons for Canada. The over-quota tariff rate in 1996 was $311 per metric ton, but not less than 239.3 percent. Compared with 1996 production levels, the U.S. TRQ was around 0.07 percent of domestic U.S. production, while the Canadian TRQ was about 0.11 percent of domestic Canadian production. The 1997 U.S. TRQ was 16,391 metric tonnes and 4,371

metric tons for Canada. The over-quota tariff was $297 per metric ton, but not less than 228.4 percent ad valorem.

4.5 Trade Issues and Patterns

Trade flow of potatoes between the U.S. and Canada is generally accomplished without incident. Overall inspection and certification of potatoes for U.S. import requirements is performed by Agriculture and Agri-Food Canada's inspection service, and USDA officials certify U.S. potatoes as meeting Canadian import requirements.

A summary of the current barriers to Canada-U.S. trade in table potatoes is as follows:

- British Columbia's antidumping duties
- Phytosanitary restrictions/standards
- Grading, labelling, and packing standards
- Bulk shipment regulation
- Provincial transportation fees

From an inter-province perspective, the barriers to trade include all of the above barriers except the first. In the table stock and seed markets, Canada and the U.S. have been each other's largest trading partners for a number of years. In the process market, while the U.S. is Canada's target market, Japan is the U.S.'s largest market (Statistics Canada - TIERS 1997; U.S. Department of Commerce 1997). Since 1992, Canada-U.S. trade in table potatoes (except seed) has been relatively balanced (table 4-3). Canadian exports to the U.S. are concentrated in the eastern region of the country, mainly from New Brunswick and P.E.I. to Maine and other northeastern and north-central states. U.S. exports to Canada are concentrated in the western region, mainly from Washington and Idaho to British Columbia and Alberta (table 4-4).

Table 4-3. Canada's Trade in Table Potatoes and Total Agri-Food Products with the United States, 1993-1997

	Canadian exports to U.S.									
	1993		1994		1995		1996		1997	
	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)
Fresh Potatoes	239,863	61,181	179,726	60,038	203,320	55,863	306,143	90,258	226,860	64,177
Total Agri-Food	*N.A.*	*7,517,271*	*N.A.*	*8,263,916*	*N.A.*	*8,720,497*	*N.A.*	*10,113,485*	*N.A.*	*12,857,813*
	U.S. exports to Canada									
	1993		1994		1995		1996		1997	
	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)	tonne	(C$000)
Fresh Potatoes	208,163	77,288	253,087	93,536	215,015	84,715	219,069	80,399	247,849	83,254
Total Agri-Food[1]	*N/A.*	*6,611,816*	*N/A.*	*7,380,155*	*N/A.*	*7,755,659*	*N/A.*	*7,596,366*	*N/A.*	*8,606,793*

N/A. means not applicable (one cannot sum all agri-food quantities as units of measure differ between agri-food products)

[1] includes fish

Source: Statistics Canada, TIERS

Table 4-4. Provincial Share of Canadian Exports of Table Potatoes to the U.S. in 1996 and 1997

	1996		share	1997		share
	Qty (tonne)	Value ($000)	of value	Qty (tonne)	Value ($000)	of value
Eastern Region			**70%**			**65%**
Prince Edward Island	133,636	42,682	47%	87,170	26,329	41%
Nova Scotia	265	94	0%	838	238	0%
New Brunswick	77,186	20,907	23%	61,926	15,331	24%
Central Region			**20%**			**30%**
Quebec	22,612	6,993	8%	22,471	7,657	12%
Ontario	33,141	10,878	12%	44,982	11,856	18%
Western Region			**10%**			**5%**
Manitoba	24,496	5,396	6%	7,276	1,890	3%
Saskatchewan	2,083	828	1%	753	406	1%
Alberta	10,721	2,059	2%	1,343	445	1%
British Columbia	1,992	410	0%	82	18	0%
Total	**306,132**	**90,247**		**226,841**	**64,170**	

Source: Statistics Canada, TIERS

The trends that the U.S. has displayed with Canada in table potato trade is shared with other countries. For example, table 4-5 outlines U.S. trade patterns in table potatoes from 1992 to 1996 with all U.S. trade partners. Table 4-5 reveals a U.S. trade surplus in three of the five years and a deficit in the remaining two years.

Table 4-5. U.S. World Trade in Table Potatoes, 1992-1996

	Imports	Exports
	tonnes	
1992	124,098	226,810
1993	245,634	229,867
1994	184,163	281,473
1995	208,222	243,423
1996	313,412	255,901

Source: USITC, 1997 (Table 2-15)

Although data concerning export trends of Alberta table potatoes and import trends of the British Columbia table potato market are available from Statistics Canada, difficulties surround the documentation of inter-province trade statistics, specifically, volumes of trade flows between Alberta and British Columbia. The dearth of such information is a result of the lack of monitoring and reporting of such trade. In effect, volumes of table potatoes traded between provinces are unreported to any public agency.

Trade data linking Alberta and the State of Washington suggest that Alberta imports of table potatoes from Washington have been larger than exports (table 4-6). The highly populated areas of Edmonton and Calgary represent an export market for fresh Washington table potatoes in early spring and late fall, when stored-Alberta table potatoes are on the shelf. Alberta is a net importer of table potatoes. In 1996, however, exports to

Washington surged— table potato exports from Alberta to Washington increased more than 300 percent from year-earlier levels, rising above two thousand tonne in that year. British Columbia's annual import trade volumes from Washington from 1991 to 1996 appear consistently to have been in the 40,000- 50,000 metric tonne range (table 4-6). However, British Columbia's geographic position permits it to serve as an entry point for Washington table potatoes destined for various locations in western Canada. These destinations include British Columbia as well as Alberta, Saskatchewan and Manitoba. It is therefore difficult to assess recent import patterns of Washington potatoes into the British Columbia table potato market alone.

British Columbia imports from Washington have consistently exceeded exports and imports have been increasing steadily since 1991. The actual final destinations of these shipments however, cannot be told for certain. Therefore the 45,000 tonnes of table potatoes that were imported from the state of Washington in 1996 were not necessarily all destined for the British Columbia market, and thus were not necessarily all consumed in British Columbia.

Table 4-6. Alberta and British Columbia Trade in Table Potatoes with the United States (1992-1997)

	Exports to U.S.											
	1992		1993		1994		1995		1996		1997	
	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)
Alberta	41	7	231	77	1,410	493	2,203	1,112	10,721	2,060	1,343	445
British Columbia	0	0	41	13	389	78	1,088	317	1,992	410	82	18

	Imports from U.S.											
	1992		1993		1994		1995		1996		1997	
	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)	tonne	(CS000)
Alberta	10,674	2,951	12,308	4,197	20,981	6,396	14,785	5,614	15,722	5,660	21,570	6,262
British Columbia	62,808	18,102	73,904	25,229	77,665	24,900	66,893	23,990	80,300	26,933	76,254	24,200

Source: Statistics Canada, TIERS

4.6 Summary

Agricultural trade policy in world potato markets is governed by the World Trade Organization and follows the provisions of the Agreement on Agriculture, one of the many agreements resulting from the Uruguay Round of GATT negotiations. To date, no substantial gains have been secured by major potato producing countries, as a result of the Agreement on Agriculture. Trade policy in the North American table potato market is governed by the North American Free Trade Agreement. Since Canada and the U.S. are each other's largest trading partner in table potatoes, the NAFTA plays an important role in maintaining a conducive trading environment. Trade between Canada and the U.S. in table potatoes in highly regional, with the western U.S. exporting to western Canadian provinces, and the eastern U.S. importing from eastern Canadian provinces. In the west, British Columbia serves as a port of entry for much of the table potato trade that occurs in that area, with flows from the pacific northwestern U.S. and other western Canadian provinces, including Alberta.

CHAPTER 5

Assessing Alberta's Competitiveness in the British Columbia Table Potato Market: Methodology

Alberta's competitiveness in the British Columbia table potato market is analysed in detail with respect to (1) the size of the British Columbia table potato market, (2) Alberta's cost-competitiveness into the British Columbia market, and (3) British Columbia table potato buyer preferences. To put the research in perspective, an overview of broad-based economic studies on potato trade is also outlined below.

5.1 North American Potato Trade: Related Studies

The focus in this sub-chapter is the economics of North American potato trade, market trends, and the empirical techniques used to analyse potato trade issues.

Descriptive studies of potato trade in North America include Buckley and Mai (1986) and Zepp et al. (1995) Market shares and per capita consumption issues are examined by Buckley and Mai (1986), who also review U.S. potato market trends. The rising U.S. per capita consumption of potatoes in the late 1980's is attributed to the demand for processed potato products increasing more than the fall in table potato demand, a trend that holds true in Canada today.

Zepp et al. (1995) compare the U.S. and Canadian potato industries from the 1930's onward. An overview is presented of Canada-U.S. similarities and differences in

production and consumption patterns, trade, and policy development.

Several empirical studies of the potato industry have appeared. Goodwin et al. (1988) use a four-equation time-series model to estimate potato prices in four U.S. cities. In trying to determine what influences price, the model suggests that state of origin, package type, and season of marketing significantly influence price.

A number of studies focus on estimating demand elasticities for the various potato products. Own-price elasticities of U.S. table potato demand (both Marshallian and Hicksian) are estimated in Guenthner et al. (1991), Miranda and Glauber (1993) and Richards et al. (1997). Miranda and Glauber (1993) use both maximum likelihood and stochastic dynamic programming estimation methods to develop a non-linear, rational expectations model of the U.S. fall potato market. Income elasticities for table and processing demand were also provided. In Love and Willet (1990), price flexibility of U.S. table and frozen potato demand are estimated.

Pertinent results from Guenthner et al. (1991) suggest that (1) the price elasticity of table potato demand is very inelastic, (2) price flexibility of table potato demand is very high, (3) income elasticities are positive for frozen products but negative for fresh products, and (4) consumer preference for convenience causes a shift from table to processed potatoes.

The USITC (1997) develop an econometric model to illustrate the competitive conditions that exist in and between the U.S. table stock and frozen french fry potato markets. The model results suggest that increased trade with Canada (i.e., increased U.S. imports) in table stock potatoes has little effect on U.S. prices and production, but does

displace table stock potatoes produced and consumed in the Northeastern U.S. In 1996 for example, Canadian product captured 31 percent of the Boston market.

5.2 Assessing Alberta's Competitiveness in the British Columbia Table Potato Market

Alberta's competitiveness in the British Columbia table potato market is determined first by estimating the size of the British Columbia market, indicating the potential volumes that can be filled by competing suppliers. Second, it is assessed by analysing the cost-competitiveness of Alberta table potato producers with respect to competing suppliers' costs in accessing the British Columbia market. These estimates permit an indication of the direction of trade flows and an approximate indication of magnitude. Finally British Columbia table potato buyer preferences are examined in order to determine whether the Alberta product is preferred to, or is considered inferior to competing suppliers' product.

5.2.1 *Estimating the Size of the British Columbia Table Potato Market*

Lack of inter-province movement of potatoes within Canada makes the task of estimating the size of the market based on production patterns and trade flows alone a difficult one. Though marketing boards may have some idea of the quantities moved in and out of the province by their producers, neither Statistics Canada nor Agriculture and Agri-Food Canada have reliable estimates of inter-province movements[14].

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14 Inter-province product movement data is crucial in order to generate supply and demand functions as well as provincial per capita consumption figures and market shares.

In the absence of the inter-province trade data, the size of the British Columbia table potato market can be estimated based on the per capita consumption levels in the province. Appendix I illustrates one method of calculating a per capita consumption figure for the British Columbia table potato market (which in turn is used to estimate the size of this market) and lists potato per capita consumption figures for all provinces in Canada. This analysis is done for four reasons:

- From the literature reviewed, it is revealed that all current and past estimates of per capita potato consumption have been on a Canada-wide basis, and have not estimated provincial per capita consumption estimates;
- It is not likely that nation-wide estimates can be accurately extrapolated to the provincial level, given that he product is bulky and not traded to a great extent between provinces;
- From the literature reviewed, no attempts have yet been made to incorporate the different preferences of consumers into the per capita consumption calculation;
- The approach used here is a partial, or first-step approach to estimating per capita potato consumption in the Canadian provinces. It seeks only to modify national per capita consumption estimates by one factor believed crucial for an accurate estimate of per capita potato consumption. This factor, *ethnic origin of the consumer*, incorporates the alternative preferences for potatoes, specifically, in Asian consumers, into the provincial per capita consumption calculation. It has

been suggested[15] that the high percentage of Asian population in British Columbia leads to a lower per capita consumption of potatoes in the province.

To attain a per capita table potato consumption figure, it is assumed that the harvesting/production patterns of British Columbia table potato farmers accurately reflect the consumption patterns of the British Columbia table potato buyers. For example in British Columbia, 63.6 percent of potatoes were produced for the table market in 1996 (see Appendix I).

5.2.2 *Cost-Competitiveness of Alberta Producers in British Columbia*

Alberta's cost-competitiveness in the British Columbia table potato market is an important aspect of assessing Alberta's overall competitiveness in the British Columbia table potato market. A comparison of the cost of production in the three regions (Alberta, PNW, British Columbia) allows at least a preliminary examination of the cost-competitiveness of each region with respect to the other. This is done by estimating the total variable costs (TVC) of producing table potatoes in British Columbia, Alberta, Washington, and Idaho, and the cost of delivering those potatoes to Vancouver, British Columbia, based on 1995 costs and tariff levels.

The degree of market integration in the Canada-U.S. table potato industries also affects Alberta's competitiveness in the British Columbia market relative to neighbouring PNW producers. A recent study of the competitiveness of the Canada-U.S. table potato

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15 Personal conversation with J. Shimek. Agriculture and Agri-Food Canada, Market and Industry Services Branch.

industry, contends that one of the most striking recent emergences in the potato industry has been the development of a truly North American market, rather than separate U.S. and Canadian markets (O'Melveny and Meyers 1997).

Conclusions of market integration can be drawn from non-price information that currently exists in the North American market for table potatoes, including: (1) Trade flows and trends, (2) Product harmonization, and (3) Cost-competitiveness between the two regions. For lack of reliable price data, conclusions of market integration based on empirically estimating the law of one price[16] are not drawn in this report.

5.2.3 *Market Preference Methodology*

Market preference methodology refers to the examination of buyer preferences in a

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A common empirical method of determining the degree of market integration is a test for the law of one price (LOP). This condition implies an identical common currency price for a common good between two regions linked in trade. Further, the only factor discrediting one region's price to the other's is the cost of transporting the product from the exporter to the importer (Carter and Hamilton 1989; Goodwin et al 1990). Goodwin and Schroeder (1990) ascertain that the preceding LOP concept (otherwise known as the arbitrage concept) reflects two regional markets that are integrated. In the same context, Ravallion (1986) refers to this condition as a facilitator for two markets to be *spatially* integrated. To test for the law of one price, and thus perfect market integration, Richardson (1978) uses a model of context similar to the following, represented as equation (1).

$$P_{it}^{1} = \gamma_0 (P_{it}^{2})^{\gamma_1} (\psi_{12,t})^{\gamma_2} (Tr_{it})^{\gamma_3} (R_{it})^{\gamma_4} \qquad (1)$$

where P_{it}^{1} is the price of good i at time t in region 1, P_{it}^{2} is the price of good i at time t in region 2, ψ_{12} is the exchange rate of region 2's currency in terms of region 1's, Tr_{it} is the cost of transactions (including transportation) of good i at time t, and R_{it} represents a vector of residuals for any difference between region 1 and region 2's price. To test for LOP the null hypothesis is $\gamma_0=\gamma_1=\gamma_2=\gamma_3=\gamma_4=1$. In the event that two markets are perfectly spatially integrated, and thus the LOP holds, Sexton et al (1991) propose competitive as well as pricing efficiency (Buccola 1985) implications. In this study, reliable price estimates in a common export market in western Canada or the PNW were unattainable. Further research into this area, however, would benefit the western potato industry in attempts to empirically test the LOP concept and thus test whether the recent claim of an integrated market holds true in prices.

particular market, in this case, the British Columbia table potato market. In recent empirical research literature, in such contexts as marketing, evaluating environmental amenities, and decision making, stated preference models have been used extensively as the primary research methodology (Louviere 1988; Adamowicz et al. 1992; McFadden 1986). A stated preference model is a discrete choice model which simulates what a respondent is willing to do. Respondents do not make behavioural changes, they simply state what they would do. Evidence from stated and revealed preference modelling suggests that stated preference models appear to reflect the actions taken by respondents (Adamowicz et al. 1992).

Discrete choice models are one application of Random Utility Theory (McFadden, 1974). Further detail into the theory and logic behind discrete choice experiments can be found in Louviere (1981), Louviere and Hensher (1982), and Louviere and Woodworth (1983).

The analytical framework on which stated preference analysis is based is the principle that choices can be modelled using a random utility framework. Ultimately, a utility function for the choices must be introduced with respect to the attributes and the levels of those choices.

The purpose in estimating such a utility function is that it provides a ready estimate of the price changes necessary to make one choice comparable to another within a particular attribute. These money choices can be read directly from the utility function.

The theoretical utility function of Adamowicz et al. (1992), as presented in equation (2), will be used to estimate British Columbia table potato buyers' preferences.

$$U_{in}=V(X_{in})+\epsilon(X_{in}) \quad (2)$$

where, U_{in} = buyer n's utility of choosing alternative product i
V = the indirect utility function associated with the alternative
X_{in} = a vector of attribute values for alternative i as viewed by respondent n
ϵ = a random element associated with error in measurements of utility,

Base data for the model arise from a survey distributed to British Columbia table potato buyers. The analysis is performed using questionnaires distributed to wholesale buyers. Due to time and cost constraints, buyers of table potatoes in the British Columbia market at the wholesale level were used to gather the information. These wholesalers are the purchasers of table potatoes who will in turn sell their goods to the retail grocery stores, restaurants and farmer's markets for example.

This information is important to Alberta producers for two reasons: (1) If the attributes suggested by the British Columbia buyers are consistent with their current planting practices, then the marketing focus is to search for alternative reasons for the lack of sales in to the British Columbia market; and (2) If the attributes suggested by the British Columbia buyers are inconsistent with their current planting practices, then the marketing focus is to alter domestic production practices to meet the needs of the buyers, or alter the needs of the British Columbia buyers.

For model specification purposes, four factors were chosen for the survey design which included *source*, *size*, *type* and *price*. In order to gain a perspective of the competitiveness of the neighbouring regions in the British Columbia table potato market, the Canadian provinces of Alberta and British Columbia and the three PNW states (Idaho,

Oregon and Washington) were used as the *source* variables. This facilitates the response of whether or not origin of growth of the table potato makes a difference to the British Columbia buyer.

For the *size* variable, three common sizes of table potatoes were used: small, medium and large. This variable allows the respondent to choose whether purchases are made based on a size factor. Similarly, the *type* and *price* variable were used to allow the respondent to choose whether purchases are made based on a type factor (this variable varied between three common types of table potatoes grown in Alberta and British Columbia— whites, russets and yellows) or whether purchases are made based on a price factor, where prices fluctuated between three common prices of wholesale table potatoes— $15, $20 and $25 per 100 pounds (cwt).

The survey puts the respondent in different hypothetical buying situations (i.e., "As a buyer in the British Columbia table potato market, which potato would you buy, A or B, or would you choose not to buy neither A nor B?" - see Appendix III attached). As a result, buyer attributes as well as situational changes (market changes) are easily identified (Adamowicz et al. 1995).

The rationale of a survey such as this is that there are various attributes of a table potato which result in the decision to purchase or not to purchase a particular potato. The importance of these attributes can be examined using a questionnaire to assess how purchasers make their buying decisions. For this reason, a survey instrument was constructed which varied these attributes to produce a set of scenarios that could be presented to potato buyers. Table 5-1 shows the characteristics (factors) and their

specified attributes (levels) used to create the survey.

Table 5-1. Factors and Levels Within the Stated Preference Model

		LEVELS		
		Level 1	**Level 2**	**Level 3**
FACTORS	**Source**	Alberta	British Columbia	PNW U.S.
	Size	small	medium	large
	Type	white	red	yellow
	Price ($/cwt)	15	20	25

Source: Discussions with industry representatives and wholesale buyers in western Canada and U.S.

In the survey, each question sets out three different alternatives involving profiles of table potatoes. The respondent is asked to choose the one alternative that best satisfies their needs for supplying table potatoes to the British Columbia market. Each respondent was asked to make 12 purchase decisions. For each decision, the wholesaler was presented with three choices: Choices A and B always differed, and each represented a combination of factors, including source, size, type, and price attributes for the potato profile. Choice C was the '*no*' alternative, allowing the respondent to choose *not* to buy either profile A or profile B.

Following the theoretical utility function represented in equation (2) on page 54, the estimated utility function with respect to buyers' perceptions of varied profiles of table potatoes in the British Columbia market can be represented as:

$$U_i=\beta_i(S_i+Sz_i+T_i+P)+\epsilon \quad (3)$$

where, U_i = the British Columbia buyers' utility of choosing alternative potato profile i

S_i = source of potato, i=1 is Alberta
i=2 is British Columbia
i=3 is Pacific Northwestern US

Sz_i = size of table potato, i=1 is small
i=2 is medium
i=3 is large

T_i = Type of table potato, i=1 is white
i=2 is red
i=3 is yellow

P = delivered price per hundredweight to Vancouver, BC in Canadian dollars

$\beta_{i,\ 1...n}$ = parameters to be estimated

Following the design of equation (3), a stated preference model for table potato purchases in the British Columbia market is estimated. The empirical model estimated by this equation is shown on page in 66 chapter 6.

5.3 Summary

The approach used to assess the size and type of markets for Alberta potatoes in British Columbia has several factors. These are (1) modifying per capita potato consumption estimates based on the ethnic characteristics of British Columbia potato consumers, (2) using secondary data to assess the relative cost-competitiveness of Alberta potato producers, and (3) adopting a methodology to determine wholesaler preferences for table potatoes in British Columbia. Stated preference (or market preference) methodology is used to determine whether changes in table potato demand are related to consumer preferences for the specific table potato attributes found in the Alberta potato. By

estimating the potential volumes that Alberta producers could be shipping into the British Columbia market, based on their cost-competitiveness, the combined analyses allow for an indication of the market potential of Alberta producers in British Columbia.

CHAPTER 6

Results and Discussion

Alberta's overall competitiveness in accessing the British Columbia table potato market is measured on the basis of the size of the market available to Alberta producers, the cost-competitiveness of the Alberta producers relative to neighbouring suppliers (including the degree of market integration in the Canada-U.S. table potato market), as well as the preferences of the buyers of table potatoes in the British Columbia market. Based on the results of this chapter, an estimate of the potential trade flows to British Columbia from competing suppliers is presented in Appendix II.

6.1 Estimating the Size of the British Columbia Table Potato Market

As earlier discussed, a problem encountered in researching potato marketing and trade (as well as a wide variety of other agricultural products) is lack of information concerning inter-province movement of product within Canada. Neither exports nor imports moving between provinces are tabulated by any public agency. Though marketing boards may have some idea of the quantities moved in and out of the province by their producers, neither Statistics Canada nor Agriculture and Agri-Food Canada have a reliable estimate of these movements.

For research in the potato sector, for example, inter-province product movement data would be useful to generate, with a high degree of confidence, supply and demand

functions as well as exact estimates of provincial per capita consumption figures and market shares. In the absence of the inter-province trade data, supply curves, per capita consumption, and the "size" of the British Columbia table potato market must be estimated based on the best information available. Appendix I illustrates a method for calculating a per capita consumption figure for the British Columbia potato[17] market (which in turn is used to estimate the size of this market) and lists the per capita potato consumption figures for all provinces in Canada. British Columbia has the smallest potato per capita consumption rate at 48.3 kg of potatoes consumed per person per year. This estimate is based on the assumption that the high percentage of Asian population in British Columbia leads to a lower per capita consumption of potatoes in the province. With a 1996 British Columbia population of 3.7 million (Statistics Canada on-line), the size of the annual British Columbia potato market is estimated at 182,000 tonnes.

In order to calculate the size of the *table* potato market in British Columbia, the same methods used to calculate the size of the *total* potato market in British Columbia (182,000 tonnes) are employed. Based on the harvesting percentages of potatoes in British Columbia (table 6-1), and a low production-to-consumption ratio of potatoes in that province[18], the per capita table potato consumption rate in British Columbia is estimated.

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[17] Refers to both table and processed potatoes.

[18] Personal Conversation: British Columbia Ministry of Agriculture, Fisheries and Food, 1996.

Table 6-1. Breakdown of the British Columbia Potato Industry, 1996

	Percentage Breakdown	Total Size of Market[1]	BC Production	Imports
Table Potatoes	64%	116,480	65,000	51,480
Processed Potatoes	19%	34,580	19,000	15,580
Seed Potatoes	17%	30,940	18,000	12,940
		182,000	102,000	80,000

[1] See Appendix I

Source: British Columbia Ministry of Agriculture, Fisheries and Food, 1996

In British Columbia, 19 percent of potatoes are produced for the processing sector, with 64 percent and 17 percent produced for the table and seed markets respectively. With information only on the production breakdown, it is difficult to obtain exact British Columbia that per capita *table* potato consumption figures. Given a low production-consumption ratio and population estimates, it is estimated that 30.9 kilograms of table potatoes were consumed per capita in British Columbia in 1996. This estimate suggests a table potato market of 117,000 tonnes in British Columbia in 1996 (see Appendix I for detailed calculations).

6.2 Cost-Competitiveness

Any measurement of competitiveness is constrained by the availability of data. Ideally, a sound approach to assess the competitiveness of a firm or industry would be to obtain

firm-specific data on production costs, market shares and profits resulting from prevailing market prices. However, for this study market shares and profits for potato industries supplying table potatoes to the British Columbia market were unattainable. As a result, this assessment of competitiveness focusses on average production costs in shipping table potatoes to British Columbia, rather than on market shares or profits.

A primary indicator of competitiveness is average variable cost (AVC) of production per unit of output. As shown in detail in table 6-2, the estimated total variable costs (which includes AVC plus transportation and tariff costs and anti-dumping duties[19]) of producing table potatoes in British Columbia, Alberta, Washington, and Idaho are compared. These figures were estimated on a per tonne basis delivered to Vancouver, as per 1995 tariffs (Canada, Minister of Supply and Services 1988) and transportation costs (Dixon 1997; Herch 1997). Each region's costs were estimated using comparable components including seed, fertilizer, chemicals, fuel, irrigation (fuel and electricity), repairs (machinery, buildings), utilities, miscellaneous overhead, operating interest, and labour.

Alberta is, on average, $18 per tonne more cost-competitive than two of the three competitors examined here in accessing the British Columbia table potato market. Alberta is $15 per tonne less cost-competitive than Washington in accessing the British Columbia table potato market. British Columbia has the highest average and total cost of production per tonne at $172. From a cost perspective alone, the state of Washington is the most competitive region in the British Columbia table potato market with a total

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[19] See section 4.5 of this report.

variable cost (TVC) of $137 per tonne (25 percent less than the cost to British Columbia growers).

Alberta and Idaho are about equally cost-competitive in the British Columbia market. While Alberta's average cost of production is approximately 18 percent higher than Idaho's, transportation costs and an import protection (tariffs and anti-dumping duties) for Idaho make Idaho the less cost-competitive of the two regions ($152 per tonne in Alberta as compared to $167 per tonne in Idaho) in shipping table potatoes to British Columbia.

A potential for self-sufficiency in potato production in British Columbia exists, as the British Columbia climate and soil are excellent for growing a high quality potato. The high cost of production in all regions of British Columbia and the lack of import barriers to foreign potatoes, however, make it difficult for British Columbia producers to serve the entire local market. Large acreage and a long growing season exist in regions of the PNW, mainly Washington. This region has a cost structure that permits it to be cost-competitive in the British Columbia table potato market, based on 1995 costs and exchange rates.

Incorporating changes in exchange rates allows for an indication of the current competitive position of the U.S. suppliers in British Columbia, compared to Alberta producers. During 1998, the average Canada-U.S. exchange rate has been approximately U.S.$0.68 (Pacific Exchange Rate Service). This translates into higher landed costs for U.S. producers in Canada. On September 1, 1998 the Canada-U.S. exchange rate was U.S.$0.64 (Pacific Exchange Rate Service).

Table 6-2. Estimated Total Variable Cost (TVC) of Table Potato Production[1] With Varying Exchange Rates

	Yield (tonnes/acre)	TVC/ acre (C$)	AVC/ tonne (C$) (=TVC/yield)	Table Premium (C$)[2]	Transportation (C$/tonne)	Cdn. Import tariff ($ /tonne)	Anti-dumping Duties ($/tonne)[5]	Estimated TVC ($/tonne) Exchange Rate=US$0.73[7]
British Columbia	15	2496	162	10	0	0	N/A	**172**
Alberta	10	1106	110	0	42[3]	0	N/A	**152**
Washington	26	2426	94	0	30[4]	7.72	5.10	**137**
Idaho	14	1334	94	0	60[4]	7.72	5.10	**167**

Estimated TVC ($/tonne) Exchange Rate=US$0.68
172
152
147
178

Estimated TVC ($/tonne) Exchange Rate=US$0.64[8]
172
152
156
189

[1] 1995 levels, delivered to Vancouver, British Columbia

[2] Altough the costs for producing process and table potatoes in British Columbia are believed to be about equal, the costs for producing seed potatoes are believed to be approximately $10 per tonne less.

[3] Personal conversation with Phil Dixon, Edmonton Potato Growers

[4] Personal conversation with Chuck Herch, Colorado Transport

[5] Source: Canadian International Trade Tribunal Exhibit RR-94-007-4, Administrative Record, Vol. 15, and Statistics Canada, 1996. Note: these numbers represent the value of anti-dumping duties assessed by Revenue Canada for 1995 based on the finding that the dumping of table potatoes from the United States had caused material injury to British Columbia growers. Under the system in place since 1992, anti-dumping duties are automatically levied whenever U.S. market prices are below normal values.

[6] Avearge Canada-U.S. exchange rate for 1995. Source: PACIFIC Exchange Rate Service, http://pacific.commerce.ubc.ca/pacific.html

[7] Avearge Canada-U.S. exchange rate for 1998. Source: PACIFIC Exchange Rate Service, http://pacific.commerce.ubc.ca/pacific.html

[8] Canada-U.S. exchange rate for September 1, 1998. Source: PACIFIC Exchange Rate Service, http://pacific.commerce.ubc.ca/pacific.html

N/A: not applicable

AVC Sources: British Columbia Ministry of Agriculture, Fisheries and Food 1994; Alberta Agriculture, Food and Rural Development 1995; Co-operative Extension, Washington State University 1993; Co-operative Extension, University of Idaho 1995.

With this exchange, Idaho producers are no longer competitive in British Columbia, and Alberta producers are shown to be more cost-competitive than their Washington counterparts (table 6-2).

Alberta's cost-competitiveness in the British Columbia market relative to neighbouring PNW producers is also affected by the degree of market integration in the Canada-U.S. table potato industries. In a highly integrated market, trade distorting practices, market imperfections, and non-competitive firms can be more easily identified. Conclusions of market integration can be drawn from (1) Trade flows and trends, (2) Product harmonization, and (3) Cost-competitiveness between the two regions.

(1) **Trade flows and trends**. Evidence of an integrated North American table potato market may first be seen in the trade flows and patterns between the two countries over the last few years. It is evident from the export data that Canada and the U.S. are important and complementary trade partners in the table potato sector, where trade flow is relatively balanced. The average balance in quantities of table potato trade between the two countries was 45,000 tonnes, and C$21,000 in value from 1993 to 1997;

(2) **Product harmonization**. Further evidence of a closely related Canadian and U.S. table potato industry may be implied through grade harmonization. On January 1, 1995, the Potato Committee of the Canadian Horticultural Council and the U.S. National Potato Council implemented a process of harmonizing grading standards for table stock potatoes. Ultimately, grading standards for Canada and U.S. "No.1" graded potatoes will be

completely harmonized (Cameron and Hornbostel 1997);

(3) **Cost-competitiveness between the two regions**. Finally, the cost-competitiveness of producing regions in both countries may imply some degree of market integration. As previously examined, the estimated total variable costs of producing table potatoes in British Columbia, Alberta, Washington, and Idaho can be compared. In this case, each region is relatively cost-competitive with one another in the British Columbia market, where British Columbia is revealed as the highest cost supplier. Though a limited example, this type of analysis is relevant when considering the relatedness of the Canadian and U.S. markets and may imply a degree of market integration.

Combined, these arguments make a case that suggests the North American table potato market is highly integrated. As it pertains to this study, the relevance of a completely integrated Canada-U.S. potato market would imply equal opportunities to both PNW and Alberta producers in the British Columbia market, based on cost-competitiveness (see Appendix II for further analysis of the cost-competitiveness of Alberta and Washington producers in the British Columbia table potato market based on supply potentials to that market).

6.3 Buyer Preference

Another aspect of determining the competitiveness of Alberta table potato producers in the British Columbia market is to examine the preferences of the buyers of table potatoes in British Columbia. Do British Columbia buyers prefer to buy from the PNW? Or, if

given the choice, would they choose to buy from Alberta, or from local sources?

Stated preference methodology permits an assessment of the characteristics of table potatoes desired by British Columbia buyers. A survey was sent to all five of the large-scale table potato wholesalers in British Columbia. Four of the five surveys were returned.

The results are displayed in the utility function format as previously described (refer to equation 3 on page 57). Interpreting the results of the survey questionnaires, the utility function describing the preferences of the British Columbia wholesalers' is described in equation (4). Note: T-values are shown in parenthesis underneath the parameter estimates.

$$U\text{ (British Columbia Buyers')} \quad \underset{(-0.75)}{-0.63\,S_3} \underset{(-0.52)}{-0.35\,S_1} \underset{(-2.62)^*}{-2.74\,Sz_3} \underset{(-2.14)^*}{-1.59\,Sz_1} + \underset{(0.82)}{0.54\,T_3} + \underset{(1.52)}{1.08\,T_1} \underset{(-1.34)}{-0.097\,P} \qquad (4)$$

where, U *(British Columbia Buyers')* = the British Columbia buyers' choice utility, measured in $/cwt
S_i = source of the potato
Sz_i = size of the potato
T_i = type of potato
P = delivered price per hundredweight to Vancouver, British Columbia, measured in Canadian dollars
* represents statistical significance at 5%

The utility function is developed to compare the levels or attributes within each factor, thus indicating the attribute which is most preferred. The S_3 variable, representing PNW-sourced table potatoes has a coefficient of -0.63. The interpretation of this

coefficient is that if the British Columbia wholesaler chooses to buy the PNW-sourced table potato, his/her utility level decreases by $0.63/cwt. A similar interpretation can be used for the S_1 variable, representing Alberta-sourced table potatoes. In this case, the wholesaler loses only $0.35/cwt when choosing to buy the Alberta table potato. Table 6-3 summarizes these findings. The preceding two interpretations reveal that the British Columbia-sourced table potato (S_2) is preferred to both the Alberta (S_1) and the PNW-grown (S_3) potatoes. However, the magnitude of the utility decreases in S_3 and S_1 reveals that Alberta-sourced table potatoes are preferred to like products produced in the PNW.

The size variables reveal statistically strong responses from the British Columbia buyers. The Sz_3 variable, representing large-sized table potatoes has a coefficient of -2.74. The interpretation of this coefficient is that if the British Columbia wholesaler chooses to buy the large-sized table potato, their utility level decreases by $2.74/cwt. A similar interpretation can be used for the Sz_1 variable, representing small-sized table potatoes. In this case, the wholesaler loses only $1.59/cwt when choosing to buy the small-sized table potato. Thus the small potato is preferred to the large potato. However, the medium-sized potato, Sz_2, is preferred to both the small and large potatoes.

The type variables (T_1, T_2, and T_3) have coefficients which reveal a positive marginal utility when moving away from the comparative variable (which in this case is the red potato, T_2). In the other cases— with the source and size variables— the comparative variable was the most preferred, as revealed by the negative marginal utilities on S_1 and S_3 as well as Sz_1 and Sz_3.

Table 6-3. British Columbia Wholesalers' Utility Change Associated With Choosing Variables *Other Than* the Comparative Variable in Each Factor

Factor	Utility Change C$/cwt	Utility Change C$/tonne[1]
Source		
Alberta	-0.35	-7.72[a]
BC (comparative)	--	--
PNW	-0.63	-13.89[b]
Size		
small	-1.59	-35.05
medium (comparative)	--	--
large	-2.74	-60.41
Type		
white	1.08	23.81
red (comparative)	--	--
yellow	0.54	11.91

[1] note: cwt converted to metric tonne by dividing by 0.045359 cwt/tonne

[a] Represents the disadvantage per tonne of the Alberta producer in selling to British Columbia

[b] Represents the disadvantage per tonne of the PNW producer in selling to British Columbia

Source: Survey distributed to British Columbia table potato wholesalers (see Appendix III)

The T_3 variable, representing yellow table potatoes has a coefficient of 0.54. The interpretation of this coefficient is that if the British Columbia wholesaler chooses to buy the yellow table potato, their utility level increases by $0.54/cwt. A similar interpretation can be used for the T_1 variable, representing white table potatoes. In this case, the wholesaler gains $1.08/cwt when choosing to buy the white table potato. Thus the white potato is preferred to both the yellow and red potato.

The utility function parameter estimates also allow for the inclusion of a price incentive that would bring the *less* preferred attributes within each factor up to the level of

most preferred. Buyers reveal an anticipated preference for cheaper-priced table potatoes as revealed by the negative coefficient on the price variable, *P*. Using the coefficient on the price variable, -0.097, allows for an indication of the price reduction, for example, needed to bring the *less* preferred choice up to the level of the *most* preferred choice in a given scenario. As an example of interpreting this price incentive, the source variable is used: The price of an Alberta grown table potato would need to be $3.50 (which is 0.35/0.097) less per cwt compared to a British Columbia-grown table potato in order for the Alberta potato to be perceived *equally* to the ones grown in British Columbia. The same interpretation can be used for PNW grown potatoes. In this case, the PNW table potatoes would need to be $6.50 (which is 0.63/0.097) less per cwt in order for them to be preferred *equally* to British Columbia grown potatoes.

The price coefficient of -0.097 is economically significant, but not significantly different from zero on a statistical basis. The British Columbia wholesale-buying table potato market is made up of only five major buyers, which represents a statistically small survey size. Thus the direction of the effects, if not their precise quantitative values, is likely to represent an accurate indication of the views of British Columbia buyers of table potatoes.

6.4 Summary

One way of determining the competitiveness of the Alberta industry in the British Columbia table potato market is through an examination of factors such as cost-competitiveness, market integration, and buyer preferences in the British Columbia

market. From the cost-competitive analysis, it has been shown that Alberta is $15 per tonne less cost-competitive than Washington in accessing the British Columbia table potato market. However, from the Stated Preference model analysis, Alberta-sourced table potatoes are preferred to like products in Washington. In British Columbia, wholesalers appear willing to pay a premium price for the locally grown, medium-sized white potato.

Combining the preference analysis with the cost analysis reveals that Alberta-sourced potatoes are in a position to capture an increased share of the British Columbia table potato market, based on the preferences for Alberta potatoes versus Washington potatoes. Table 6-4 shows the base scenario: with yield in Alberta at 10 tonnes per acre, Alberta is still a higher cost supplier to British Columbia relative to Washington, even though Washington faces a higher preference disadvantage. With a 5 percent increase in Alberta yields, a similar situation arises— Alberta is still the higher cost supplier. However, if Alberta yields are increased by a mere 10 percent, the Alberta producer becomes the most cost-competitive supplier to the British Columbia table potato market. With a 15 percent increase, Alberta producers are five dollars per tonne more competitive than Washington suppliers.

Also revealed was the volatility of the cost-competitiveness of U.S. producers in British Columbia when changes in Canada-U.S. exchange rates are incorporated into the analysis. With a 12.5 percent change in the Canada-U.S. exchange rate from the 1995 level of U.S.$0.72 to the current level of U.S.$0.64, it is shown that Idaho producers are no longer competitive in shipping table potatoes to British Columbia, and Washington

producers, Alberta's main competitor, become higher cost-competitors in British Columbia. As a result, given current exchange rates, Alberta producers are the most cost-competitive supplier to the British Columbia table potato market.

Table 6-4. Summarizing Alberta's Competitiveness in the British Columbia Table Potato Market, Base Yield and 5-15% Increase in Base Yield

Supplier	*yield*	TVC ($/tonne)	Preference Disadvantage ($/tonne)	Landed Cost in BC ($/tonne)
Alberta	base	152[a]	7.72	160
	5% incr.	147[b]	7.72	155
	10% incr.	142[c]	7.72	150
	15% incr.	138[d]	7.72	146
Washington	base	137	13.89	151

[a] Total Variable Cost of production at base yield of 10 tonnes per acre
[b] Total Variable Cost of production at yield of 10.5 tonnes per acre
[c] Total Variable Cost of production at yield of 11 tonnes per acre
[d] Total Variable Cost of production at yield of 11.5 tonnes per acre

Chapter 7

Conclusions and Further Research

This study examines the British Columbia table potato market and the opportunities that exist for Alberta producers. Opportunities were analysed on the basis of the size of the market available to Alberta producers, the cost-competitiveness of the Alberta producers relative to neighbouring suppliers, and the preferences of the buyers of table potatoes in the British Columbia market.

Canada-wide per capita potato consumption figures were calculated for all provinces and territories in Canada, yielding an estimated per capita consumption rate of 48.3 kilograms per person per year for potatoes (for all uses). However, as the third highest populated province in Canada, and given its relatively low domestic potato production, British Columbia represents a market with room for expansion for its competitors. In 1996, British Columbia produced approximately 102 thousand tonne of potatoes. With a potato market size of 182 thousand tonne, the potential for a quantity of 80 thousand tonne to be supplied from other regions exists.

Further manipulation allowed for similar estimates for the table potato sector specifically. British Columbia reveals a 1996 per capita table potato consumption figure of 30.9 kilograms per person, and thus a table potato market size of 117 thousand metric tonne. With in-province production of about 65 thousand tonnes annually, the potential exists for an estimated 51,500 metric tonne of table potatoes to be supplied to the British

Columbia market.

A cost-competitiveness study of British Columbia's main competitors— Alberta and the Pacific Northwestern States— reveals that costs in the British Columbia's potato industry are higher than those in nearby regions. When delivering table potatoes to the Vancouver area, Washington is the most competitive supplier to the region, of the four suppliers examined, at C$137 per tonne, followed by Alberta at C$152 per tonne, Idaho at C$167 per tonne and British Columbia at C$172 per tonne. Further, if Alberta's yield per acre of table potatoes were to increase by 10 percent, Alberta would become the most cost-competitive supplier to the British Columbia table potato market of the regions examined. In fact, with the recent devaluation of the Canadian dollar relative to the U.S. dollar since 1996, Alberta producers have already become the most cost-competitive supplier to British Columbia.

The cost-competitive analysis was combined with an analysis of the disadvantage that competing suppliers face when exporting to British Columbia based on the preferences of the buyers in that market. In fact, since the local product is preferred to all other sourced product, British Columbia wholesalers' utility decreases by $13.89 per tonne if PNW-grown potatoes are chosen over the local product. Alberta-sourced table potatoes have a similar affect on the British Columbia wholesalers' utility, but to a lesser magnitude. Alberta is a preferred region to the PNW for sourcing table potatoes from competing suppliers in British Columbia. Thus, a potential exists for cost-competitive sales into the British Columbia market by Alberta producers.

Current trade patterns are helpful in understanding the changes now underway.

Internationally, the state of Washington ships a substantial number of table potatoes into the Canadian market, most of which are probably consumed in British Columbia. With the absence of interprovincial trade statistics, Alberta's share of this market is unknown. Non-tariff regulations may pose some, though probably modest, barriers to interprovincial trade between Alberta and British Columbia.

The supply analysis performed in Appendix II allows for an indication of the kinds of trade flows that could be taking place between British Columbia and competing suppliers if British Columbia buyers were indifferent to the factors providing the make-up of the potatoes, based on the presumption of a highly integrated Canada-U.S. potato market. In fact, buyers in the British Columbia market are not indifferent to these factors, and as a result the trade flows which could take place are significantly less than cost of production calculations would suggest.

Further research into the trade patterns and purchaser-preferences for table potatoes in western Canada needs to be explored. In order to accurately estimate provincial market shares held by other provinces, inter-province trade flows of (at least) bulk products need to be documented. This would require stringent data compiling at provincial border crossings, and would enable domestic industries and governments to more accurately outline future prospects and marketing priorities. This may also help to alleviate some of the problems associated with accurate descriptions of provincial per capita consumption levels, as mentioned earlier in this report.

Introducing hypothetical purchasing situations to a set of survey respondents has proven to be an accurate and effective method of revealing preferences for table potatoes

purchased in the British Columbia market. However, further research in this area may apply the situational survey to final purchasers of the table potatoes (that is, consumers) in British Columbia, to increase the number of observations in the survey and to get a more accurate reflection of final buyer purchase preferences. This final point relates directly to the problem encountered with the Canadian federal government's representation of per capita potato consumption levels with Canada. If consumers were the targeted survey respondents, there would also be more ethnic variety in the respondents, thus more indication of the differences in consumer preferences based on ethnic mix. This is a key factor to facilitate sound marketing decisions directed at the British Columbia table potato market.

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Appendix I Calculation of Per Capita Potato Consumption, 1996

Assumption

$C = |Y_{rn}(X_{rn})| + |Y_a(0.25X_{rn})|$

where: C= 1996 potato PCC (table plus process use) [a]
Y_{rn}= Non-Asian percent of population
Y_a= Asian percent of population
X_{rn}= Non-Asian potato pcc

Step 1. From Known Canadian Potato Per Capita Consumption (PCC) Figure, Re-calculate non-Asian potato PCC in Canada:

$C = |Y_{rn}(X_{rn})| + |Y_a(0.25X_{rn})|$ where: C= 1996 potato PCC (table plus process use) [a]
Y_{rn}= Non-Asian percent of population
Y_a= Asian percent of population
X_{rn}= Non-Asian potato PCC

$(51.4) = |(0.921)(X_{rn})| + |(0.079)(X_{rn}/4)|$
X_{rn}= 54.64 kg/ person/ yr

Step 2. Calculation of Asian potato PCC in Canada:

$X_a = (X_{rn}) * b$ where: X_{rn}= Non-Asian potato PCC (known to be 54.64 kg/person/yr)
X_a= Asian potato PCC
b= Asian potato PCC as a percentage of non-Asian potato PCC

$X_a = (54.64) * (0.25)$
X_a= 13.66 kg/ person/ yr

Step 3. Calculate provincial potato PCC figures.

Assume: $Cp = |Y_{rn}(X_{rn})| + |Y_a(0.25X_a)|$ where: Cp= Provincial potato PCC
Y_{rn}= Non-Asian percent of population
Y_a= Asian percent of population
X_{rn}= Non-Asian potato PCC
X_a= Asian potato PCC

Per Capita Potato Consumption for Table and Process Uses, Canada and Provinces, 1996.

			Y_a				Y_a
NFLD.	54.3	kg/ person/ year	0.69%	MAN.	51.9	kg/ person/ year	5.44%
P.E.I.	54.2	kg/ person/ year	0.77%	SASK.	53.5	kg/ person/ year	2.16%
N.S.	53.8	kg/ person/ year	1.64%	ALTA.	50.7	kg/ person/ year	7.74%
N.B.	54.3	kg/ person/ year	0.70%	B.C.	48.3	kg/ person/ year	12.46%
QUE.	52.6	kg/ person/ year	4.03%	YUKON	53.7	kg/ person/ year	1.91%
ONT.	49.6	kg/ person/ year	9.84%	N.W.T.	53.8	kg/ person/ year	1.72%

[a] Source: Statistics Canada, CANSIM, 1996.

APPENDIX I - *Continued*

Step 4. Conversion of Total Potato PCC to *Table* Potato PCC for British Columbia.

Know:

total potato PCC --- process --- 19 percent of total potato PCC [b]
table --- 64 percent of total potato PCC [b]
seed --- 17 percent of total potato PCC [b]

Assume: $BC_{tppcc} = BC_{fppcc} * (\beta)$ where: BC_{tppcc}= British Columbia table potato PCC
BC_{fppcc}= known British Columbia total potato pcc
β= share of total potato production captured by table potatoes

$BC_{tppcc} = 48.3 * (0.64)$
$BC_{tppcc} = 30.9$ kg/ person/ year

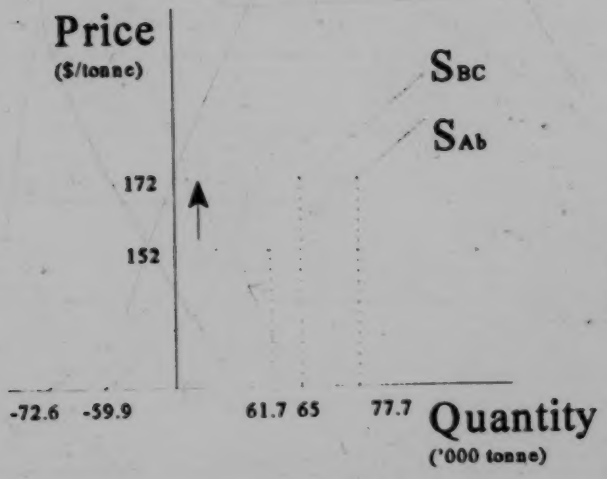
Step 5. Estimated Size of British Columbia Table Potato Market.

Assume: $MS = PCC_t * Pop$ where: MS= size of table potato market in metric tonnes
PCC_t= per capita consumption of table potatoes
Pop= population as of 1996 (number of persons)

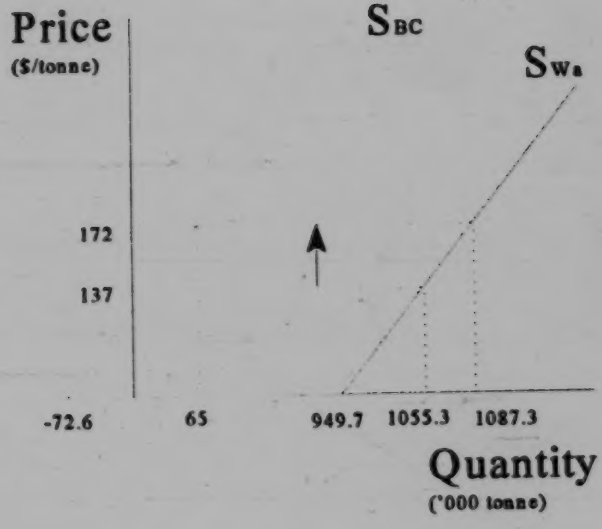
MS= (30.9) * (3,766,044)
MS= 117,000 metric tonnes

[b] Source: British Columbia Ministry of Agriculture, Fisheries and Food. 1996.

APPENDIX II Estimated British Columbia, Washington and Alberta Table Potato Supply Functions



Estimated Alberta and British Columbia Supply Functions



Estimated Washington and British Columbia Supply Functions

Cost-Competitive Analysis

Given the 1995 table potato production, cost of production estimates, and the short run elasticity of supply for potatoes,[20] cost functions for the three regions can be derived. The preceding two figures show a comparison of the estimated cost functions for British Columbia, Alberta and Washington. Estimates of 1995 table potato production in Alberta and British Columbia are 61,700 tonne and 65,000 tonne respectively. As indicated, the 1995 cost of production estimates for these regions is C$152 per tonne and C$172 per tonne respectively. Applying the common slope for these functions, the supply (or cost) relationships are produced. The interpretation of these relationships is that with a C$20 per tonne increase in the price received in Vancouver for Alberta producers, an extra 16,000 tonne would be available to be supplied to the British Columbia market by Alberta suppliers.

The same type of analysis can be applied to nearby United States p[redacted]rs—Washington's 1995 table potato production was 1.05 mmt (94 percent greater than that of

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Although the elasticity of supply for table potatoes in Canada or the U.S. is not well documented, past estimates (see Heady 1961 and Tweeten 1970) have used 0.80 as a measure of the elasticity of supply for table potatoes in North America. To test the validity of using this estimate for this study, sensitivity analysis was performed, where prevailing market prices in the respective markets fluctuated by a mere 5 percent, revealing a low degree of sensitivity of the elasticity of supply for table potatoes in Alberta, British Columbia and Washington State. As well, production technology is sufficiently similar in both countries so that supply potentials will not differ greatly between Canada and the U.S. Thus the estimate of 0.80 as a measure of the elasticity of supply for table potatoes in North America is assumed to be valid.

British Columbia) with a cost of production of C$137 per tonne. Assuming a similar slope to the cost function, the supply relationships for Washington table potatoes is derived. Washington produces a large amount of potato output, and is highly competitive in potato production. Washington is unlikely, however, to provide the British Columbia market with all of the table product it would need to satisfy British Columbia demand. This is so for at least two reasons: (1) British Columbia consumers appear to prefer product from local sources and (2) even significant price increases are unlikely to lead to major changes in Washington output, on the basis of the derived supply functions. An implication of the supply function derived for the State of Washington is that a C$35 per tonne price increase to Washington producers in Vancouver would lead to increased supply of about 32,000 tonnes.

APPENDIX III An Example Survey Questionnaire with Accompanying Cover Letter

Attention: _____ :

As part of a research project supported by Western Canadian potato producers, we are trying to assess the importance of several factors in the purchase of table potatoes. Our assessment involves a survey which we are sending out to five (5) prospective buyers.

The survey which follows consists of twelve (12) hypothetical situations in which a buyer in the British Columbia table potato market could be faced with. Each hypothetical situation, or scenario, consists of a variation of four (4) table potato characteristics or attributes. A brief explanation of each attribute is as follows:

Source Area in which the potatoes were grown

Size Can#1 *small* - 1½ to 2¼ in. diameter
regular - 2¼ to 3½ in. diameter for round varieties, 2 to 3½ in. diameter for long varieties, where at least 60% have a diameter of 2¼ in.
large - 3 to 4½ in. diameter

Type White fleshed 'baker' types: Russet Burbank, Russet Norkotah varieties
Red-skinned: Red Norland variety
Yellow fleshed: Yukon Gold, Bintje varieties

Price Wholesale price per jute (100 lb sack) in Canadian dollars delivered to the Vancouver area

All potatoes are graded Canada #1 or Yellow where Canadian grade standards apply. Assume that there are no sources of table potatoes available to choose from other than the two (2) presented to you. Assume that the selected choice best satisfies your needs for purchasing table potatoes for your market.

Please return this completed survey to us either by fax or mail as soon as possible. We respect your need for anonymity and no individual person or firm will be identified in our report.

Thank you for your co-operation.

Kevin J. Dunlevy
University of Alberta

Survey: Assessing British Columbia Wholesale Buyer's Preferred Table Potato Attributes

Scenario 1:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	British Columbia	[I would choose not to buy]
Size	small	regular	
Type	yellow fleshed	yellow fleshed	
Delivered price	C$15	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 2:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	Alberta	[I would choose not to buy]
Size	small	small	
Type	yellow fleshed	white fleshed	
Delivered price	C$25	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 3:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	British Columbia	[I would choose not to buy]
Size	regular	small	
Type	red skinned	yellow fleshed	
Delivered price	C$20	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 4:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	PNW	[I would choose not to buy]
Size	small	large	
Type	white fleshed	white fleshed	
Delivered price	C$25	C$20	
I would buy (check 1)	_____	_____	_____

Scenario 5:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	Alberta	[I would choose not to buy]
Size	regular	regular	
Type	yellow fleshed	red skinned	
Delivered price	C$15	C$15	
I would buy (check 1)	_____	_____	_____

Scenario 6:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	Alberta	[I would choose not to buy]
Size	small	regular	
Type	white fleshed	white fleshed	
Delivered price	C$20	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 7:	CHOICE A	CHOICE B	CHOICE C
Source	PNW	Alberta	[I would choose not to buy]
Size	regular	small	
Type	white fleshed	yellow fleshed	
Delivered price	C$15	C$15	
I would buy (check 1)	_____	_____	_____

Scenario 8:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	British Columbia	[I would choose not to buy]
Size	regular	small	
Type	red skinned	white fleshed	
Delivered price	C$25	C$15	
I would buy (check 1)	_____	_____	_____

Scenario 9:	CHOICE A	CHOICE B	CHOICE C
Source	PNW	British Columbia	[I would choose not to buy]
Size	regular	large	
Type	white fleshed	red skinned	
Delivered price	C$20	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 10:	CHOICE A	CHOICE B	CHOICE C
Source	PNW	British Columbia	[I would choose not to buy]
Size	small	small	
Type	white fleshed	yellow fleshed	
Delivered price	C$15	C$25	
I would buy (check 1)	_____	_____	_____

Scenario 11:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	PNW	[I would choose not to buy]
Size	small	regular	
Type	white fleshed	yellow fleshed	
Delivered price	C$20	C$15	
I would buy (check 1)	_____	_____	_____

Scenario 12:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	British Columbia	[I would choose not to buy]
Size	large	large	
Type	white fleshed	yellow fleshed	
Delivered price	C$25	C$25	
I would buy (check 1)	_____	_____	_____

APPENDIX IV Stated Preference Model (LIMDEP) Output File and Results

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Current sample contains:       72 observations.

          Tree Structure Specified for the Nested Logit Model
          Sample proportions are marginal, not conditional.
          Choices marked with * are excluded for the IIA test.

Trunk     (prop.)'Limb      (prop.)'Branch    (prop.)'Choice
Prop.)'Weight'IIA

Trunk[1]1.00000'Lmb[1'1] 1.00000'B(1'1,1) 1.00000'PA   0.50000' 1.000'
                                          'PB   0.50000' 1.000'


Model Specification: Utility Functions for Alternatives
Table entry is the attribute that multiplies the indicated parameter.

Parameter:

Row          1  S1        S3        SZ1       SZ3       T1        T3        P

Choice:

PA           1  ALBERTA   PNW       SMALL     LARGE     WHITE     YELLOW
PRICE
PB           1  ALBERTA   PNW       SMALL     LARGE     WHITE     YELLOW
PRICE

Iter=  1 F=-0.2495E+02 gtHg= 0.3443E+01 chg.F= 0.2495E+02 max'dá'=
0.1884E+07
Iter=  2 F=-0.1842E+02 gtHg= 0.8897E+00 chg.F= 0.6538E+01 max'dá'=
0.3912E+00
Iter=  3 F=-0.1797E+02 gtHg= 0.1823E+00 chg.F= 0.4412E+00 max'dá'=
0.8068E-01
Iter=  4 F=-0.1796E+02 gtHg= 0.9307E-02 chg.F= 0.1715E-01 max'dá'=
 0.4383E-02
Iter=  5 F=-0.1796E+02 gtHg= 0.2553E-04 chg.F= 0.4339E-04 max'dá'=
0.1255E-04

             ° Discrete choice (multinomial logit) model      °
             ° Maximum Likelihood Estimates                   °
             ° Dependent variable                Choice       °
             ° Number of observations              36         °
             ° Iterations completed                 5         °
             ° Log likelihood function        -17.95685       °
             ° Log L: Constants only     =    -24.95330       °
             ° Log L: No coefficients    =    -24.95330       °
```

Variable	Coefficient	Standard Error	z=b/s.e.	P['Z'>z]
S1	-0.34605	0.67066	-0.516	0.60586
S3	-0.63287	0.84777	-0.747	0.45536
SZ1	-1.5957	0.74488	-2.142	0.03217
SZ3	-2.7424	1.0467	-2.620	0.00879
T1	1.0846	0.71314	1.521	0.12829
T3	0.54233	0.65873	0.823	0.41034
P	-0.96598E-01	0.72301E-01	-1.336	0.18153

PREDICTED PROBABILITIES

Indiv	PA	PB
1	0.3933	0.6067
2	0.4511	0.5489
3	0.8229	0.1771
4	0.7852	0.2148
5	0.6324	0.3676
6	0.2474	0.7526
7	0.8643	0.1357
8	0.3882	0.6118
9	0.7059	0.2941
10	0.3165	0.6835
11	0.2883	0.7117
12	0.5489	0.4511
13	0.9254	0.0746
14	0.3676	0.6324
15	0.0572	0.9428
16	0.2024	0.7976
17	0.8399	0.1601
18	0.7976	0.2024
19	0.8921	0.1079
20	0.9187	0.0813
21	0.0335	0.9665
22	0.1172	0.8828
23	0.3105	0.6895
24	0.5705	0.4295
25	0.9168	0.0832
26	0.5413	0.4587
27	0.6389	0.3611
28	0.4697	0.5303
29	0.1254	0.8746
30	0.3469	0.6531
31	0.1428	0.8572
32	0.3994	0.6006
33	0.7799	0.2201
34	0.2277	0.7723
35	0.0273	0.9727
36	0.9595	0.0405